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SHIPPING MATTERS IN WASHINGTON.

THEY ARE GIVEN THE MAIN TRACK AT THE SHORT SESSION OF CONGRESS—RIVER AND HARBOR BILL.

Washington, D. C., Dec. 6.—Two measures of special importance to vessel men—a river and harbor bill and shipping bill—are demanding attention immediately following the opening of the short session of congress. In the senate Mr. Frye has just finished—giving two days to it—a lengthy and very able address, telling of the careful manner in which the shipping bill, after two years of labor, was finally put into its present form, and setting forth in detail the various provisions of the bill. There is, of course, no member of congress better fitted than Mr. Frye for such a task. His speech, which will be given in full in the next issue of the Review, was one of argument from beginning to end, and the senate chamber was crowded during both sessions. As Mr. Frye must occupy the chair in the senate, the care of the bill on the floor will pass to Mr. Hanna. The bill will very probably pass the senate early in the session, but its fate in the house is uncertain. A very strong lobby, representing foreign steamship lines, is already at work against it.

As a result of the diligence of Chairman Burton and his associates on the river and harbor committee, a bill which was worked up in part during the last session and since adjournment, will be presented within a week. No hearings are being granted, but delegations have been here from Pittsburg, Boston and other places talking with members of the committee and otherwise doing what they could to further the harbor interests which they represent. A Cleveland Chamber of Commerce delegation, of which Mr. E. P. Williams, vice-president of the chamber, was chairman, spent Wednesday with members of the committee and with other representatives presenting the claims of Cleveland harbor. Messrs. Harvey D. Goulder, H. G. Dalton, James R. Garfield and Secretary F. A. Scott of the chamber were other members of the delegation. In talking with members of the river and harbor committee they said that the people of Cleveland did not know that Mr. Burton's position as chairman of the committee would be to their advantage or disadvantage. Mr. Burton had a grave responsibility in the kind of bill he would present to congress. His position would not admit of special favor being shown to Cleveland. The delegation was in Washington, therefore, for the purpose of calling attention to the demands of commerce at Cleveland. The engineer department of the government had recommended widening of the harbor entrance and extension of the breakwater eastward on a large scale. A very liberal appropriation was required for the work. In talking to members of the committee on this score, the Cleveland delegation was well provided with argument. It was shown, for instance, that the tonnage of vessel property owned or controlled in Cleveland is full 40 per cent. greater than that of any other port on the lakes, and yet the appropriations for improvements at Cleveland during twenty years past have been only $2,576,000, as against $3,380,075 for the Duluth-Superior harbor, $3,208,484 for Buffalo and $2,644,000 for Chicago. Although not directly associated with lake interests, Vice-President Williams of the Cleveland Chamber of Commerce showed a thorough knowledge of harbor matters in Cleveland, and his acquaintance at Washington greatly facilitated the work of the delegation, the members of which left Washington fully satisfied that Cleveland would be well cared for in the river and harbor bill.

It is more than probable that items of a general kind relating to lake improvements will include appropriations with which to begin the construction of a second ship canal at St. Clair Flats and a second channel through the St. Mary's river, but no enlargement as yet of the Weitzel lock at the Sault. Provision will also be made for the widening of the Lime-Kilns crossing and for extensive dredging that is required in the Detroit river in the vicinity of the Lime-Kilns. J. M. M.

As had been expected, the sale of twelve steel steamers of the American Steamship Co.'s fleet by John W. Gates to the American Steel & Wire Co., which brought about considerable unfavorable comment a few weeks ago, on account of the price at which the transfer was made. is causing trouble in the American Steel & Wire Co. Proceedings to prevent the purchase of the vessels have been started in the east, and opponents of Mr. Gates in the American Steel & Wire Co. are advertising in New York, through Welles, Herrick & Hicks of No. 15 Wall street, for co-operation of stockholders in an effort to remove Mr. Gates and his associates from control of the company at the annual meeting, to be held Feb. 21.

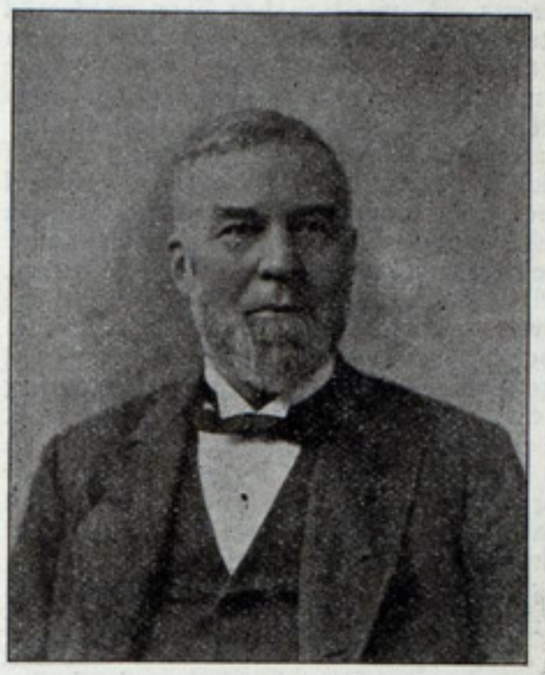
Major Thos. H. Handbury, member of the United States engineer corps and of the Mississippi river commission, who was unsuccessful in securing bids for the construction, within the time appointed, of a self-propelling, sea-going, hydraulic dredge for Mississippi river service, again advertises in this issue of the Review for proposals. According to the present advertisement, bidders are to state time of delivery, and it is also asked that bids be submitted for the construction of the dredge without outfit.

Mr. Foraker of Ohio will introduce in the senate this week a bill to appoint a second United States district judge for the district of Cleveland. This action is due to the poor health of Judge Ricks of Cleveland and also to the large increase in business of the district. A bill similar to Senator Foraker's bill will be introduced in the house shortly, probably by Mr. Southard of Toledo.

It is again rumored that Vickers' Sons & Maxim of England are trying to purchase the works of the Cramps at Philadelphia and in connection therewith the armor works of the Midvale Steel Co. As yet there is nothing definite in the rumors.

DEATH OF DAVID WHITNEY, JR.

David Whitney, Jr., of Detroit, millionaire lumberman, vessel owner and banker, died at his home in Detroit last week after a lingering illness. Several years ago he went to Carlsbad for treatment, but did not receive the benefit which was anticipated. His life was worn away through a complication of diseases, though the immediate cause of his death was enlargement of the heart. He was born at Westford, Mass., Aug. 26, 1830. After graduating from the academy there he removed to Lowell, engaging in the lumber business in a small way, which, through systematic effort was largely extended until he counted the whole of New England as his territory. He formed a partnership with his brother Charles and others and established large distributing yards at Tonawanda and Ogdensburg, N. Y., and Burlington, Vt., with the main office in Boston. In 1857 the lumber industry of Michigan began to assume large proportions and Mr. Whitney during that year removed to Detroit, where he had since resided. In addition to his large interests in lumber Mr. Whitney was one of the largest vessel owners on the lakes. Among the vessels which he operated were the propellers E. W. Oglebay, Necosta, Lansing, D. C. Whitney, Nipigon and Merida and the schooner Melbourne. He was interested in numerous enterprises and contributed largely to the material upbuilding of Detroit. He was the most unassuming of men and never aspired for social or political honors.



ERIE CANAL IMPROVEMENTS.

Major Thos. W. Symons, United States engineer at Buffalo, has had occasion, as a member of one of the New York state canal commissions, to give a great deal of attention to the subject of Erie canal improvements. He is very positively in favor of a barge canal along the Erie route as against any attempt to build a ship-canal within United States territory from the great lakes to the Atlantic seaboard. Major Symons has just prepared for the American Society of Civil Engineers a paper on the subject, "Canals from the Lakes to New York," in which he says:

"The decline of traffic on the Erie canal is due to very many causes, the principal ones being that it is not in any manner up-to-date, that the towing is still being done on it largely by horses and mules, and that the business has never been organized and conducted on modern lines. It has been seriously handicapped by the fact that improvements have been undertaken and discussed which would render the old type and size of boats obsolete; rendering it inadvisable as a business proposition for people to build new boats for canal business or to replace those outworn, with the possibility before them of a larger canal in the near future. That the traffic on the Erie canal has declined is true, but it would spring up and grow to enormous dimensions if a proper barge canal were built in its place, if legislative restrictions on the capital of operating transportation companies were removed, and if the business were organized in a thoroughly up-to-date manner. It must not be forgotten that if the Erie canal has stood still, or worse than still, for the last thirty years, the competing railroads have improved their transportation facilities enormously in ways which it is unnecessary to recount here."

LAKE SHIP YARD NOTES.

The Jenks Ship Building Co. of Port Huron has sold the steel steamer of Canadian canal dimensions which they have on the stocks and which is to be finished early next spring, but for the present the name of the purchaser is withheld. The steel steamer which they are to build for Capt. Samuel Neff of Milwaukee will be designed especially for the salt trade. Capt. Neff has a contract with the Michigan Salt Co. covering the transportation of their product from the east shore of Lake Michigan to different points in the lake region and is already operating several vessels in that trade. The new steamer will be 212 ft. long and will be modern in all respects.

F. W. Wheeler, well known as a ship builder at West Bay City up to the time of consolidation of the lake yards, is interested in the two steel steamers of Canadian canal dimensions and 13 knots speed that are to be built by the Craig Ship Building Co. of Toledo for the United Fruit Co. Mr. Wheeler's interest is in a transportation contract with the fruit company. The vessels are to carry both passengers and freight from the West Indies to North American ports.

Stock in the American Ship Building Co. was used to pay for the Wheeler works at West Bay City and for the Buffalo Dry Dock Co.'s plant, purchased several months ago, but in buying the works of the Union Dry Dock Co. at Buffalo recently the officials of the consolidation decided to pay cash, which would indicate that their earnings of late have undoubtedly been very satisfactory.

At Port Jefferson, L. I., Martin I. Woods is building a wooden four-masted schooner of 185 ft. length and is engaged in making extensive repairs to the schooner Lawrence. J. M. Bayles & Son of the same place are about to put down the keel for a wooden yacht that is to cost $45,000.

MR. C. B. ORCUTT ON THE SHIPPING BILL.

Mr. C. B. Orcutt, president of the Newport News Co., in discussing the shipping bill lately, said:

"If the Frye shipping bill shall be enacted into a law at the forthcoming session of congress, as it now seems more than probable it will be, the United States will have begun a policy that will inevitably make them early in the new century the first maritime power in the world. Nearly 100 years ago the first of Democratic presidents declared the four pillars of the prosperity of the republic are agriculture, manufactures, commerce and navigation. That broad statement is as true today as when it was uttered and it will be true through all times, for it defines economic conditions that have their foundation in nature itself. In our progress as a nation—that is, in the legislative measures passed to advance and facilitate our industrial development—we have not given equal fostering care to these diverse interests. Navigation has been neglected and ignored to so ruinous an extent that we are now paying foreign ship owners the enormous sum of $165,000,000 annually to transport for us our exports and imports. To summarize the situation in another form only 9 per cent. of our gigantic foreign trade is carried in bottoms holding American registers. A more fatuous policy cannot be imagined. If we had not wisely protected our lake and coast carrying trade we should in it present the same pitiable spectacle that is now manifest in the foreign department. Who are responsible for this disastrous state of affairs? Beyond all question the free trade wing of the old Democratic party. I knew that the change from wooden to iron vessels, together with the subsequent war of the rebellion, were contributory causes to the disappearance of the flag from the ocean, but the evils thereby produced would have been remedied long ago had it not been for the unrelenting political and legislative opposition of the party to which I have referred. Because of their command of the columns of influential newspapers in different parts of the country they have, up to within the last three or four years, succeeded in misleading public opinion on this question and casting odium upon all that advocated the remedial measure that would save to our people the enormous drain upon their resources.

"The majority of the voters of the country at last see through the fallacies of this school of economists and they have taken steps that will result in placing the country in its proper place on the ocean. The bill of Senator Frye does this and the issue having been decided at the ballot box the Republican party in congress should, before the 4th of March, press it to a vote and enact it into a law. Under our radically changed conditions as a nation we cannot be safe or independent until we are in a position to carry on and to protect our foreign commerce. Our own flag must fly over it, not the flag of Great Britain, or France or Germany or Russia or Italy, Sweden, Portugal or our late enemy, Spain.

"They must not be permitted any longer to grow rich at our expense. Suppose Europe became involved in a general war, what would become of the surplus products of our farms, factories and mines that we now in constantly increasing volume sell to the old world? We could bring it to the sea coast, and there the great bulk of it would have to remain unless we had ships to take it to its destination. It could not be put into foreign bottoms without paying war insurance rates that would amount to almost confiscation. And Europe is such a volcano at the present time that no one can divine the hour or the day when it may belch forth its fires of destruction. Surely it behooves every man in public life to do all in his power to safeguard the vital interests of the nation in the event of so awful a contingency.

"The passage of an adequate shipping bill will stimulate not the shipping interest alone, but every other department of industry without a single exception. This may appear to be bordering on exaggeration, but it is absolutely true, and will be clear to anyone who stops to give the questions the slightest consideration. For instance, I defy any man to name a single product of a factory or a mine that does not enter into the construction of a modern first-class ship. Scarcely an industry exists that is not called upon for its contribution, either in the building or equipment of one of these giant structures. And what product of the farm is not required on a ship? Not a single one. The ship of today, in fact, draws to itself products of all the activities of man in every branch of industry. Help it and all are helped. Depress it, and all share in the depression.

"Look at the question from another point of view—what a vast field the building up of our commercial marine will open up for the young men of the country that are now vainly seeking employment in the crowded ranks of the other industries? Ship yard labor is one of the best paid of all branches of industry. It embraces scores of skilled trades that, unlike many other occupations, possess the immense advantage of being independent of the weather conditions for their pursuit. The statesmanship that closes its eyes to this fact is hopelessly blind.

"But the time for debate on the restoration of our commercial marine has passed. The subject has been discussed to tatters and the hour for action has come. We must take our foreign carrying trade, as much of it as possible, out of the hands of foreign nations, that, friends today, may be enemies tomorrow. To do so is essential to our prosperity in peace and to our safety in war. We cannot be said to be truly independent until we have won back our place on the ocean."

ADMIRAL RODGERS GOES TO THE ASIATIC STATION.

The action of the navy department in selecting Rear Admiral Frederick Rodgers for duty on the Asiatic station is based on the decision of the administration to conduct a joint military and naval campaign of the most active character in the Philippines. With Admiral Rodgers there will be three officers of flag rank in Asiatic waters. Admiral Remey will be, as heretofore, the senior officer, with the rank of commander-in-chief of the station. The intention of the department is to have one of these three flag officers act as an administrator ashore, while each of the others will command a division of the fleet. It is probable that Admiral Remey will establish shore headquarters at Cavite and from there direct the operations of the divisions under Admirals Rodgers and Kempff. One of these divisions is likely to be sent to China, while the other will have charge of the larger division to cooperate with the army in the Philippines. Admiral Remey has earned the reputation of a splendid administrator. His work as commandant of the Key West naval base in the war with Spain was complimented highly by the navy department.

DEATH OF REAR ADMIRAL McNAIR.

Rear Admiral McNair died suddenly of apoplexy at Washington last week. He had recently been detached from the superintendence of the naval academy at Annapolis and was on waiting orders. Admiral McNair was the senior rear admiral of the navy, being ranked only by Admiral Dewey. He would have reached the retiring age, 62 years, on Jan. 13, 1901. If the grade of admiral had not been revived for Dewey's benefit, Admiral McNair would have stood at the head of the list. His last sea command was on the Asiatic station, and he consented to be detached from it before his tour of duty had expired to give his friend Dewey a chance to fly his flag. Dewey assumed command of the Asiatic squadron in January, 1898, and within five months had won the notable victory of Manila bay, which might have been McNair's. Admiral McNair had said frequently recently that he believed he would not reach the retiring age. His health has been very poor for many months. After his return from the Asiatic station he was on waiting orders for a short time, and on July 15, 1898, was appointed superintendent of the naval academy. Soon after he entered upon his duties at Annapolis Admiral Cervera and the officers of the Spanish squadron destroyed off Santiago were sent to Annapolis as prisoners of war, and Admiral McNair was charged with their care. He treated them more as guests than as prisoners, and Cervera and the other Spanish officers have taken occasion to express their appreciation of his uniform courtesy and kindness.

Admiral McNair's health has been failing for a year or more. Last spring he was detached from the superintendency of the academy on account of sickness and has been on waiting orders since. His death will cause the promotion of Capt. Mortimer L. Johnson to the grade of rear admiral.

Admiral McNair was born in Pennsylvania and appointed to the naval academy from that state Sept. 21, 1853. In 1859 he was assigned to the steam frigate Minnesota of the East India squadron. Early in the civil war he went to the steam sloop Iroquois of the west gulf squadron and participated in the bombardment of Forts Jackson and St. Philip and Chalmette batteries, the engagements at Grand gulf, the passage, both ways, of the Vicksburg batteries, and the destruction of the confederate ram Arkansas. He served also in the war on the steam sloops Juniata and Seminole with the South Atlantic blockading squadron and participated in both attacks on Fort Fisher. He ranked as lieutenant and lieutenant commander in the war period. His first command was the Kearsarge, which sunk the Alabama, serving on her from 1875 to 1878.

PRESIDENT McKINLEY ON THE MERCHANT MARINE.

President McKinley in his message to congress makes the following recommendation for the upbuilding of the American merchant marine:

"American vessels during the past three years have carried about 9 per cent. of our exports and imports. Foreign ships should carry the least, not the greatest part of American trade. The remarkable growth of our steel industries, the progress of ship building for the domestic trade, and our steadily maintained expenditures for the navy have created an opportunity to place the United States in the first rank of commercial maritime powers. Besides realizing a proper national aspiration, this will mean the establishment and healthy growth along our coasts of a distinctive national industry, expanding the field for the profitable employment of labor and capital. It will increase the transportation facilities and reduce freight charges on the vast volume of products brought from the interior to the seaboard for export, and will strengthen an arm of the national defense upon which the founders of the government and their successors have relied. In again urging immediate action by the congress on measures to promote American shipping and foreign trade, I direct attention to the recommendations on the subject in previous messages, and particularly to the opinion expressed in the message of 1899: 'I am satisfied the judgment of the country favors the policy of aid to our merchant marine, which will broaden our commerce and markets and upbuild our sea-carrying capacity for the products of agriculture and manufacture, which, with the increase of our navy, mean more work and wages to our countrymen, as well as a safeguard to American interests in every part of the world."

RAIL AND WATER ROUTE FROM DULUTH TO QUEBEC.

A Quebec dispatch says that the rail and water route of the Great Northern railroad between Duluth and Quebec has been completed and the first grain train was run over it this week. The grain was shipped from Duluth and consigned to Liverpool. The projectors of the Great Northern assert that their line shortens the distance for shippers between those two points by 802 miles. The grain is carried by water to Parry sound, thence over the tracks of the Canada Atlantic to its junction with the Great Northern, by which line it is carried to the elevators at Quebec. James McNaught of McNaught & Redding, 35 Nassau street, New York, who is the chief promoter of the enterprise, says the new line is assured of a prosperous future. He asserts that the local business alone of the Great Northern in the Province of Quebec will more than pay the expenses and fixed charges of the line. The road runs through a well-populated and highly productive farming country in the province which has heretofore been greatly hampered by the lack of facilities for moving crops to the large markets.

BIDS SOLICITED FOR THREE PROTECTED CRUISERS.

The navy department this week advertised for proposals for constructing by contract three protected cruisers. The bids will be received at the department until 12 o'clock noon, Friday, Feb. 1, 1901, when they will be publicly opened. A circular defining the chief characteristics of the vessels has been prepared for distribution among bidders. Forms of proposal and contract will be furnished after Dec. 15. The department reserves the right to reject any and all bids not considered advantageous to the government, and no bids will be considered which propose to furnish vessels of less than 9,700 tons trial displacement, or of less than 22 knots speed on trial, or having a bunker capacity of less than 1,500 tons of coal. The vessels are to be completed within thirty-six months.

The Pacific Coast Co., according to its president, J. G. Farrell, who is at present in New York, is contemplating the building of several new steamships. It operates at present twenty-two steamships.

"WHAT CALIFORNIA HAS DONE FOR SHIP BUILDING."

Under the caption of "What California Has Done for Ship Building," Irving M. Scott, vice president and general manager of the Union Iron Works of San Francisco, writes as follows in the Independent:

"What has California done for the American navy? She has set the type of ships, in quality, workmanship and speed, and in their ability to perform continuously what they were designed to do. She has demonstrated that this side of the continent is able to assist the central government in defending its coast; that the central government is vastly benefited by the development of the resources of this section of the country; and, furthermore, that it can recruit ships with men from the ranches and the lumber districts who have the requisites of good fighters equally with men born anywhere else on the soil of America. Prior to the time of the Charleston only passenger ships and colliers were built on the Pacific slope. The cruiser Charleston was built on English plans bought from the Armstrongs by William C. Whitney. The plans were supposed to represent the best evolution from the Chilian cruiser Esmeralda—as shown in the building of the Nanai Wakan, constructed for the Japanese navy—and called for a cruiser of 3,750 tons displacement, 18 knots and 7,000 H.P. The Charleston shafts could not be made in this country, and, by special permission, Mr. Whitney had them made by Krupp at Essen. The Charleston's performance was 18½ knots with 6,666 H.P., thus exceeding the Nanai Wakan in speed and using less horse power to attain that speed. It was the first of the new ships ordered under the Cleveland administration to be completed and put into commission.

"The second California built war vessel was the San Francisco, a cruiser of 4,000 tons displacement, with engines and hull designed by the navy department of the United States. The shafts were the first built by the Bethlehem people under the Whitworth system of fluid compressed steel, hollow forged. The San Francisco exceeded her contract requirements three-quarters of a knot, and was considered the best all-around ship of her class in the United States navy.

"The San Francisco was followed by the Monterey, a double-turreted monitor making 14 knots, a very great advance, regarding speed, on any monitor previously built. It was the first monitor to successfully cross a great ocean, going from San Francisco to Manila, over 7,000 miles, without any trouble. She was built for coast defense, and not intended to go very far from her base of supplies, and her coal carrying capacity was small, thus limiting her radius of action. She coaled at Honolulu, and was supplied during the remainder of the trip with coal from a tender.

"Next in order came the Olympia, whose speed was phenomenal, her official record being 1¾ knots faster than the requirement. Her unofficial performance was 2.15 knots more than the contract figures. She was very nearly as fast as the Columbia or the Minneapolis; is a better ship than either; carries a larger battery and cost $1,000,000 less than either of them. The Olympia has two sets of engines of exactly the same type as those in the Minneapolis and Columbia, the exception being that they each have three sets of engines and the Olympia two. She was Dewey's flagship at Manila, and shares with the great admiral the glory of the fight.

"California's next triumph was in the Oregon, a battleship of exactly the same type as the Indiana and Massachusetts. The three were designed and ordered at the same time, and were all to make 15 knots. The Indiana made 15 and a small fraction; the Massachusetts 16 and a small fraction; the Oregon 17.79 knots. The Oregon's famous run from San Francisco to Santiago de Cuba is historical. She was in perfect order when she got there, went into the fight, and her performance was conspicuous above that of any other battleship engaged, due to the fighting qualities of Capt. Charles Clark and the skill of Chief Engineer Milligan. After the war the Oregon was cleaned and painted in the navy yard at Brooklyn, but was not overhauled. Then, in company with the Iowa, a crack ship of the east, she started for Manila. The Oregon reached there in due season, ready for action. The Iowa came to San Francisco for repairs, and has not reached Manila yet. The California built ship was in continuous service up to the time she was run ashore, in Chinese waters, and it is said that she is now under orders to proceed to Port Orchard, Puget Sound, where the damages to her hull will be repaired.

"After the Oregon, the gunboats Wheeling and Marietta were launched here. They were each 1,000 tons burden, steel hulls, sheathed. The Marietta went from Sitka to Boston, being in company with the Oregon from Valparaiso to Bahia, on the coast of Brazil. The Marietta made this trip without any breakdown, and did as well the work she was designed to as any of the big battleships did the work of their class. She was dubbed the Bull Calf by Rear Admiral Melville, her designer, who complained that the correspondents overlooked the Marietta and gave all the praise to the Oregon. The torpedo boat Farragut, with a record of 31½ knots, is the fastest boat in the American navy. Although the Farragut, California built, has now been in commission more than a year, other boats of the same class, ordered at the same time, have not yet been delivered to the government—namely, the Stringham and the Goldsborough. The latest product of the west, in the line of battleships, is the great Wisconsin, 1,000 tons bigger than the Oregon, with contract speed of a knot more, ordered at the same time and from the same plans as the Alabama and the Illinois. The Alabama has had her trial, which was considered phenomenal. Her speed was 17.013 knots, and her spurt was 18.43 knots; the Wisconsin's speed was 17½ knots; her spurt 18.54 knots for more than nine hours, and, after the trial, she ran eighteen hours, averaging 15 4-10 knots by natural draft, proving her capacity to fulfill her contract speed of 16 knots with natural draft and good coal. The Wisconsin holds the record for battleships of her class in the American navy today. She will be followed from the ways by the torpedo boat destroyers Perry, Paul Jones and Preble. The Perry was launched Oct. 27 and the others will be shortly hereafter. Then will come the single-turreted monitor Wyoming, which is now being finished, and the sheathed cruiser Tacoma.

"From the foregoing it will be seen that the ships built in San Francisco are superior in every respect to those built on the Atlantic coast, and for the plain reason that the building of battleships for the government has attained a better development in San Francisco than in any other part of the United States.

"Less than a score of years have passed since the first merchant ship was constructed at the Union Iron Works. It was the collier Arago, and the second vessel was the Pacific Coast Steamship Co.'s passenger steamer Pomona. The demands of the merchant marine augmented California's ship building enterprise. The Senator and the St. Paul were next wedded to the wave here and both were chartered by the government as transports for the army service on the Manila route. Three ships were built for the Wilder Co. of Honolulu, for passenger and freight service, two of them with steel hulls and one with wooden hull. The freight ship Californian, for the American-Hawaiian Co., is the largest ship built for the merchant marine on the Pacific coast, having 11,800 tons displacement. She was launched May 12, and in July sailed for Manila under charter of the United States government. For the same company are now being built the Alaskan and the Arizonian, each 16,500 tons displacement, and these will be the largest freight steamships built in America up to date. We are also building here the passenger steamer Spokane, to ply between San Francisco and Seattle at a speed of 17 knots. The ferryboat Berkeley, the largest double ended ferryboat on the western coast, operated by a single screw at each end and having a seating capacity of 1,700 people; the side wheel steel ferry boat San Pablo, built for the Atchison, Topeka & Santa Fe Co., to ply between San Francisco and Point Richmond, and the Tamalapais, a similar boat, to run between San Francisco and Sausalita, are additional products, and these, with numerous other craft—tugs, yachts and small boats—prove the substantial establishment of the ship building industry on the Bay of San Francisco.

"Today 4,000 men are employed at the Union Iron Works, builders of warships on the Pacific coast, and 14,700 people depend upon those works for their daily bread. In 1860 only twenty-two men were employed there. California has furnished splendid specimens of modern work to the new merchant marine, but her progress in the building of warships of the highest pattern has astonished not only the nation, but the world."

PACIFIC COAST SHIP BUILDING.

From the Scientific American.

The ship building industry on the Pacific coast for the past three year has enjoyed a period of extraordinary activity. From January, 1898, to September, 1900, thirty-two months, the number of new ships built aggregates seventy-four, with a total tonnage capacity of 37,910. Government vessels are not included in the list. Of the new craft, forty-five, with a tonnage of 14,229, were schooners, five were barkentines of 4,597 tons, one was a barge of 632 tons, and twenty-three were steamers having a tonnage of 18,452. The largest of the schooners rated 985 tons, and of the steamers, 4,597 tons. Of the latter, three, aggregating 7,298 tons, were built of iron, the others of wood. San Francisco builders were the constructors of the larger number of both iron and wooden ships; but almost every port on the coast, from San Pedro to Puget sound, wherever the necessary supplies of lumber were to be had, contributed to the total result. Creditable as the exhibit is, the outlook is even more flattering. There is not a ship builder along the 2,000 miles of coast who has not all the work contracted for that can possibly be handled, and who could not easily duplicate his present undertakings if the supply of labor warranted it.

The cause of this prosperity is easily explained. For many years prior to 1898 the industry languished, and the carrying trade, which had been stimulated by artificial "booms," was greatly depressed. Dividends on marine property were small. The earnings were swallowed by heavy expenses. Losses by sea were not made good, and the actual number of coast ships considerably decreased.

Just at the time that the maritime prospect seemed darkest, the extraordinary development of Alaska began. It was found that the number of vessels available for this profitable traffic was far below the demand. Every vessel that could be procured was chartered for the Alaska trade. High charters caused many to be withdrawn from the coast carrying trade, and a considerable scarcity of vessels for ordinary requirements began to be felt.

It was thought that the Alaska demand would be but temporary; but the contrary proved to be the case. It continued to increase, and is bound to be permanent. The Cape Nome traffic of the present year withdrew at least 100 vessels of all sorts from available supplies; and with new discoveries along the Alaska coast, and the location of camps that indicate every sign of permanency, the demand for a greater number of craft than was required in 1900 is undoubted. The charters for 1901 for the carrying trade of the far north already assure this. The increased demand for vessels for the Hawaiian and Philippine trade has greatly depleted the coast fleet, until there is an actual insufficiency of vessels for the ordinary coastwise traffic. The dispersion of a great number of vessels to distant points occurs at a time when the conditions of Pacific ports are more prosperous than for many years, and when trade is remarkably active. Ocean freights have continued to advance until fifty shillings is asked on wheat charters to Liverpool, yet, even at this extraordinary figure, there are but few vessels available. The values of cereals in California, Oregon and Washington are uncommonly depressed, not because foodstuffs are not in demand, but for the reason that transportation cannot be engaged to deliver them.

Except in one instance, the single tonnage capacity of the new ships is not noticeably great; but the general average indicates a gradual increase in size. The steamer Californian, referred to, an iron ship of 4,597 tons, built for the Hawaiian trade, and now in the Philippines, is the largest vessel of her class ever launched on the western coast. If we except the steam schooner, a vessel which is said to be of a type peculiar to Pacific coast waters, the coast vessels do not differ greatly in character from those constructed elsewhere in the United States. The largest schooner ever built was of 600 tons. These vessels are designed for the shallow harbors of the coast, and are, consequently, all of light draught and exceptional beam. Their carrying capacity is great and their seaworthiness uncommonly good. Most of them are fitted for passenger traffic, and have cabins on the upper deck aft, though in some instances the cabins are in the center. They are fitted with compound engines, and have an average speed of ten knots. Being schooner-rigged, they are largely independent of steam propulsion. The type is economical as regards the running expenses, both of crew and motive power.

PAINTS AND VARNISHES.

THEIR COMPOSITION AND CLASSIFICATION DISCUSSED FROM A SHIP STANDPOINT —VALUABLE PAPER ON AN INTERESTING SUBJECT—SHIP'S-BOTTOM PAINTS—VARNISHES SHOULD BE MADE FOR THE PURPOSES FOR WHICH THEY ARE INTENDED.

One of the most valuable papers read at the recent meeting of the Society of Naval Architects and Marine Engineers in New York dealt with the subject "Composition and Classification of Paints and Varnishes." The paper was valuable from the standpoint that the proceedings of the society thus far contain little if any information on this score. Prof. A. H. Sabin, author of the paper, is chemist with Edward Smith & Co., varnish makers and color grinders of New York. Space will not admit of the paper being printed in full, but liberal extracts are made from it. First is a description of the principal pigments. Then it is noted that the principal oil used as a vehicle is linseed. This is made by expression from flaxseed; the crude oil is purified by settling, letting it stand two or three months in tanks at a temperature not lower than 70° F.; it is finally filtered. It should be quite clear and free from sediment, also free from cloudiness, which commonly indicates the presence of water as an emulsion.

Dryers take up oxygen from the air and give it up to the oil. These dryers are compounds of lead and maganese, in solution in the oil; these metals have the power of forming two sets of oxygenated compounds, the peroxidized ones having twice as much oxygen as the others. When, in linseed oil they give up half their oxygen to the oil, then, being exposed to the air, they absorb a fresh equivalent of oxygen, which again the oil takes from them; in this way they act as carriers of oxygen from the air to the oil; acting, of course, only when the oil is spread out in a film and exposed to the air. Since the oil is thus converted into a solid dry substance these agents are called dryers. To secure the proper drying of a naturally slow-drying paint with the least possible amount of dryer, and to get the dryer which will have the least deleterious effect on the paint is a problem which calls not only for a great deal of knowledge of the matter but also for a considerable amount of experimenting. A factory where such goods are made ought to have a laboratory where hundreds of carefully conducted and recorded experiments may be continually carried on. And when we come to the use of dryers in varnished and varnish paints, the intricacy and difficulty of the problems become greatly increased, and even a small gain is often of great value.

The term "japan" is also applied to substances which promote the drying of a paint film. It cannot be said that there is any sharp line of definition between what are called dryers and what are called japans; but what we usually apply the latter term to is a liquid which, by itself, dries to a hard film, having considerable coherence; this is often produced by the use of some resin in the compound, not common rosin or colophony, but some of the varnish resins. Such a compound partakes of the nature of a varnish; and some of the japans, such as those in which colors are ground for coach painting, are practically varnishes heavily charged with lead and manganese. Such japans would not be called dryers; and on the other hand, some of the dryers, notably the low temperature dryers, when evaporated, leave a greasy metallic soap for a residue, and such a dryer would not be called a japan; but the two classes shade into one another, and some preparations would be called dryers by one man and japans by another. A japan always has a drying effect; that is, when added to oil it promotes oxidation in the film.

Most oil paints contain some turpentine or other volatile solvent. It is generally agreed that turpentine is the best of these; it is slow to evaporate, and any residue which does not evaporate readily, oxidizes into a durable resinous substance, highly elastic, while benzine, which is often used as a substitute, is more rapidly volatile; the result being that whereas the turpentine mixture retains its complete fluidity some little time after brushing out into a film, and so the brush marks flow out and disappear, and the whole surface becomes smooth and uniform; but if benzine is used it evaporates immediately and the paint becomes comparatively stiff and shows brush marks and all imperfections of surface.

PAINTING THE BOTTOMS OF IRON OR STEEL SHIPS.

In making ships' bottom paints most common resin used is kauri, which comes from New Zealand, and is obtained in many grades, differing from each other in color and hardness, and in the amount of dirt of one sort or another which is found in the lumps of resin. The large pieces of resin are cleaned by chipping off the outside with a knife or chisel. These chips contain a good deal of resin, and this is the material commonly used as the foundation of a varnish for ships' bottom paints. This material is dissolved in a mixture of coal tar naphtha and benzine; sometimes a little varnish made by dissolving some cheap resin in wood alcohol is added to it, and with this is mixed the pigment, which may contain poisonous matter to make it an anti-fouling coating. Almost all the hard drying ships' bottom paints use some sort of a varnish of this sort as their liquid part. It may be of interest in this place to give a short account of ships' bottom paints in general. The writer has recently compiled a list of American patents of these paints running back to No. 346 in 1837. As they are not made a special class or subclass by our patent office it is worth while to give them. They are as follows, indicating them by their serial numbers, with those in parentheses which are out of print:

346	69,185	123,801	236,216	441,291	531,610
40,515	75,915	124,204	241,694	441,292	552,418
48,221	86,104	128,777	249,424	444,665	552,744
(48,323)	90,022	142,117	274,888	446,818	561,296
48,583	90,395	149,697	303,330	447,941	575,800
49,567	92,757	152,513	307,451	454,744	580,409
56,078	95,494	158,902	312,784	(457,342)	581,487
58,458	(98,862)	179,004	331,383	459,751	594,048
61,064	99,497	179,180	356,505	488,479	614,403
64,638	(103,290)	190,761	377,810	496,895	
65,639	108,474	192,037	389,875	504,211	
(67,733)	122,949	207,997	441,290	521,382	

In general, the subject of painting the bottoms of iron ships may be divided into the preservation of the metal from corrosion and the prevention of fouling. The former is secured by applying any good anti-corrosive paint, and the problem, so far, is like the preservation of metallic structures in general. Some of the paint manufacturers attempt to do this by a special paint; others aim to make their anti-fouling compound keep the water from the metal plates and serve both uses. The anti-fouling paints work by poisoning the organisms which attach themselves to the ship, and are chiefly of three kinds. One of these has for its active agent the oxides of copper; these were, in the first instance, ground and mixed with Stockholm tar. The copper was supposed to slowly dissolve and to kill the adhering organisms. Its use was suggested by the successful use of copper sheathing on wooden ships, but the generally accepted theory of the action of the copper sheathing is that it acts, not by poisoning, but by a process of exfoliation or scaling off; that animals attach themselves to it, but that an outer layer of the copper peels off and leaves a fresh surface. The writer has had no considerable experience with copper sheathing, but has been told by experienced ship builders that copper plates often seem to have this foliated structure only near the surface, and after two or three years' use the more solid and unstratified body of the plate is reached, after which no considerable protective action is noticed. If this is the case it is difficult to see how a copper paint will give much protection, but this is a matter in which facts are of more use than theory. Another sort of copper paint is a copper soap, made by precipitating a solution of common soap with a solution of some salt of copper, thus making an oleate or some similar salt of copper. This is a soapy or greasy substance, insoluble in water, and is applied hot, making a thick coating. This is not a good foundation for animals or plants to attach themselves to, and it is continually wearing away. Such a material is very different from any ordinary paint, and is more like a coating of cement than a paint, but it is commonly classed here. Some of the paints of this class give good results, but, of course, they must be frequently applied. They do not, however, need any time to dry, hence the ship may be put in the water immediately, which is one of the essentials in much of the work on ships' bottoms. The third, and, at present, the most numerous class of paints, are the varnish paints, already partly described, made from a spirit varnish. The pigment in these may be almost anything; commonly it is oxide of iron, sometimes with some white lead or white zinc; sometimes the coloring matter is Paris green, or some green pigment suggesting copper. The poisonous matter may be some arsenical compound, but in some of the most successful ones it is a mercury compound. The arsenical compounds are very cheap, and are undoubtedly poisonous, but the mercury compounds are more intensely poisonous, that is, they poison with a less amount, but they are very expensive, costing for the most part about a dollar per pound of contained mercury. It may be doubted whether there is much choice among the mercury compounds, as the sea water will convert any of them into corrosive sublimate. The essential thing seems to be to get a varnish which will last as long as possible, regard being had to the absolute necessity of having one which will dry almost immediately, then to put in enough mercury or other poison to last as long as the varnish does, in quantity sufficient to kill everything with which it comes in contact.

The points to be investigated, therefore, are to find out what resin or mixture of resins will give sufficient hardness to resist the abrasive action produced by the passage of the ship through the water, together with enough toughness to prevent it from flaking off; it must also be as nonporous as possible, so that the water may not be able to dissolve out the poisonous matter too rapidly. The nature of the solvent which is used to dissolve the resin has also something to do in this matter. It may be found advisable to dissolve the poisonous matter in the solvent, or it may be disadvantageous to do this. The common practice has been to use mineral poisons; but organic ones may, in the end, prove most suitable. In ordinary varnish making it is necessary to use mixtures of varnishes made from different resins to get the desired qualities; it would then be only reasonable to expect to have to do the same thing in this case. Sea water, which holds in solution every common elementary substance in some compound, is a great solvent and a chemical agent of unknown but certainly great powers; and this whole matter, which, so far as is known to the writer, has never been the subject of any very systematic investigation, will require many years of connected and intelligent work before it can be claimed to be on any such basis as our knowledge of paints for ordinary use. What seems to have been done so far is that manufacturers have invented or bought formulae of more or less value and put paints made by these on the market; if they were of any merit they have survived; but there seems to be no connected body of knowledge concerning the subject. Oil paints have been used for ships' bottoms, but have not been satisfactory on account of the perishable nature of oil films in sea water; some success has been had with paints made with oil and resin varnishes, but if these dry quickly they are perishable, and where durable varnishes have been used they have been too slow for work which has to be hurried. The writer has lately—about a year and a half ago—started a set of systematic experiments on this subject, but it will very likely be some years before any results worth publishing will be reached.

MAKING OIL AND RESIN VARNISHES.

The following are the more important points in making oil and resin varnishes: Nearly all varnish resins are alike in this, that they must be melted by heat—and a considerable proportion, from 10 to 25 per cent., distilled off, leaving a residue, which, in some cases, and probably in all, has been produced by decomposing in this way the original resin, and this decomposition product is the substance which unites with the linseed oil to make varnish. As soon as this point is reached the kettle is withdrawn from the fire, and a measured quantity of hot oil is slowly added to and mixed with the melted resin. As the final varnish film is to consist of the compound thus formed, it is obvious that the proportion of oil now added is the most important matter in determining the composition of the varnish; the weight of resin must always be 100 lbs. for the standard size of kettle, because a larger or smaller amount will not melt so well. The amount of oil added varies from eight to ten gallons to twenty-five or thirty gallons; for special purposes it is possible to make a varnish with as little as three and as much as forty gallons of oil. The normal amount of oil seems to be from fifteen to twenty-five gallons, and when we approach either extreme great care and skill on the part of the varnish maker are required, and the differences in the resins used become more accentuated. The mixture is now heated for several hours, until the oil and resin have combined; if only a little oil is present a short period of

cooking is required—only an hour or two; but in other cases it is continued for six or eight and sometimes as much as fifteen or eighteen hours. In the best and most modern practice it is usual to conduct this treatment according to certain established temperature curves, which differ not only with different amounts and varieties of oil, but also for different resins; the less scientific makers depend on the appearance of samples taken for inspection from time to time from the kettle. It is hardly ever possible to make a varnish in one operation which has the combination of qualities desired by the consumer; it is necessary to make a mixture of two or three of widely differing properties. The art of mixing varnishes is one of great complexity, and calls for complete knowledge not only of the component parts but also of their effect in combination. After the varnish is made and put in the tank it undergoes changes for some weeks or months before it arrives at a stable condition.

VARNISHES MUST BE MADE FOR THE PURPOSES FOR WHICH THEY ARE INTENDED.

Many people have the idea that varnishes are used for decorative purposes because of their beautiful surface, and that they are not suited to exterior use for protection against the weather. This belief is partly caused by the fact that paints for outside house painting, which have been mixed with enough varnish to make them glossy, have not proved very lasting; but this is because, not wishing to increase very much the cost of paint, a cheap interior varnish has been used, not in any way suited for the purpose. The ordinary house painter knows as little about varnish as the average astronomer, and his mixtures are not likely to give satisfaction to his employer any more than they would to a varnish expert. Another cause for lack of faith is that railway coaches, which are protected by varnish, require frequent refinishing. This is because they are constantly being rushed through a cloud of sand, siliceous dust and cinders, mixed with condensed steam and coal smoke at rates of thirty to fifty miles an hour, and the surface is simply ground off. The wonder is that anything can be made to last a year. No passenger will willingly hold his hand out of a car window for five minutes. Nothing but varnish will stand it. Another case is in the use of spar varnish on a ship or yacht. This needs revarnishing every season, sometimes oftener than that. Since spar varnish is of good quality and intended for outside use this would seem to be a fair criticism. But it should be remembered first, that this is a very severe exposure, exposed to the intense heat of the sun reflected by the water; it is a case of continual wet and dry; and, finally, that the surface is frequently rubbed and polished by the sailors. Another and important reason lies in the constitution of the varnish itself; probably four-fifths of all the spar varnish made is used for what may be called repair work; every little while it is the practice to revarnish, and in these cases it is essential that the varnish should dry hard over night so that the vessel may go into use on the following day. In order to meet this condition the maker finds it necessary to make such a varnish thinner than usual, so as to secure a thin coat which will dry quickly, and, of course, only one coat is used. A varnish which would dry hard over night in a thick coat would be too hard and inelastic to be good. But if we are to compare a varnish film with one of paint we must allow it thirty-six to seventy-two hours to dry, and at least a month to harden, for that is what a paint requires, and a varnish can be made on those specifications which will outlast any oil paint film that ever was made. Of course, no ordinary varnish is like that, but this is only in line with what has already been said, that a varnish must be made especially for the use to which it is to be put, and that the varnish maker who has the most knowledge of the subject will have the greatest success. A varnish film is very much less porous than an oil film; the compound of oil and resin is far more indifferent to chemical action than oil alone, and as it possesses a very high degree of elasticity, it is, on this account, greatly superior to a spirit varnish film which consists of a brittle resinous substance; it has, or should have, a substantial and appreciable thickness; it is hard and glossy, where an oil film is soft and spongy, and is in every way made more substantial; but the same pigments may be used in varnish, thus making varnish paints or enamel paints, which are as much better than varnish as oil paints are better than oil. For marine exposures especially the writer's own experiments (see Transactions Am. Soc. C. E., Vol. XXXVI, p. 483, and Vol. XLIII, p. 444) have conclusively shown that varnishes and varnish paints are greatly superior to oil paints or red lead, while the baked enamels are much better than either.

THE RACE FOR THE AMERICA'S CUP.

A dispatch from Bristol, R. I., announces that every day during the week something new cropped out about the Herreshoff shops to denote that the work on the hull of the cup defender will begin in a very brief time. In the blacksmith shop during the week new chain plates for the shrouds were forged out, and the job of getting out straps and struts was begun also. It is an early start on such work, but double sets of these things are to be made, principally the strappings which are to go in the interior of the new cup defender. The work of making the cup defender's sails is well under way. Two of the jibs to be used on the boat are now partly made. Foreman Hathaway has half a dozen sailmakers at work, but probably as many more will be hired a month hence.

It is learned from two or three different sources, most of which are reliable, that the members of the cup defence syndicate will contribute $50,000 each to back the enterprise of building the new boat soon to be begun. The total of $250,000 would indicate that the best of everything that money can buy will enter into the boat's construction.

The announcement at the New York Yacht club headquarters that William Butler Duncan will manage the new cup defender gives general satisfaction, as it is recognized that Mr. Duncan's scientific attainments, his gentlemanly manner and his practical experience as a racing man will insure the cleanest of sport in racing for the cup.

The Herreshoff boat shops and the different other shops that are auxiliary to the larger structures, have just had a new and independent electric lighting system established, which, no doubt, will be used to considerable extent between now and next May in aiding in the pushing of the work on the new yacht.

A Glasgow dispatch says: "Of all the arrangements connected with the latest challenge for the America's cup there was none which gave rise to the same amount of indecision as the fixing of the part to be played by the first Shamrock. Her designer never quite lost faith in the boat, and Sir Thomas Lipton, in his anxiety to get the best possible boat which can be built in Britain, irrespective of all other considerations, was inclined to invite Mr. Fife to make what alterations he considered advisable to the ex-challenger, and to have her ready for racing against the new boat which Mr. George L. Watson has designed. Against this there was the natural desire of many yachting men to see the Shamrock brought back as nearly as possible to her cup racing trim, so that the trial races between her and the Shamrock II. should give some kind of definite idea as to how the new boat compares with the Columbia. Sir Thomas Lipton viewed both of these courses with about equal favor, and it is only within the past few weeks that he finally decided to refit the Shamrock in her old form and get whatever advantage could be gained from the line which will thus be drawn between the form of the Shamrock II. and the Columbia, and, presumably, the new defender. The consideration which brought him to this conclusion was the report of Capt. Sycamore on the American boat. Sycamore was greatly taken with the appearance of the Columbia and his report was emphatic that, in his opinion, no amount of tinkering would ever make the Shamrock able to beat her. If this opinion was reliable, and if the Shamrock could not be made as fast as the Columbia, it was, of course, better that she should be preserved in her known form, and for this purpose she was towed over to Greenock and dry docked for examination. Her condition was an eloquent testimony of the excellence of manganese bronze, for it was found that the underbody was as perfect and almost as clean as on the days on which she sailed her races. The aluminum was, however, in a sorry state where it was exposed to the action of the salt water. Right along the water line it was pitted with corrosion which went nearly through the plates. There was likely to be some difficulty and some delay in procuring plates of the same aluminum alloy to renew the damaged parts, and it was, therefore, decided to use ordinary mild steel for the job. Over the bronze there were two strakes of aluminum plating forming the topsides. The under strake has been stripped off from stem to stern and steel plates have now been rivetted on. There was a difficulty in the danger of corrosion which exists when bronze and steel are brought together, and it has been sought to overcome this by putting strips of canvas heavily coated with white lead between the two metals. The only other alterations carried out to the hull were the fitting of a new taffrail and the renewing of some of the internal struts which showed signs of weakness. Some little fittings will probably be added inside, and it is expected that the refitting of the racing spars and gear will then be proceeded with in time to enable her to go out for the Riviera season if sport enough offers. So far as the building of the new boat is concerned, the speculation now indulged in deals chiefly with the material of which she will be made. There seems to be a general belief that he will turn out a boat composed largely or wholly of what may be described as fancy metals.

COAL CONSUMPTION OF WATER TUBE BOILERS.

The following from a recent number of Engineering, London, is of interest to American readers:

As our readers are aware, Messrs. Thomas Wilson, Sons & Co., Ltd., of Hull, have been experimenting some years with water tube boilers, and the engineering world has been looking anxiously to learn the result. The Pall Mall Gazette of Nov. 6 published a statement of the result, bringing out that, although there was a saving in weight of 100 tons when comparison was made with the ordinary cylindrical boiler installation, the coal consumption was so much greater—16 tons a day—that 480 tons more had to be carried in the bunkers. In view of the repeated inaccurate representation of facts regarding the water tube boiler question published in the Pall Mall Gazette, we reserved judgment until the appearance of Messrs. Wilson's official statement, giving the accurate result, which indicates that not only was the weight of boilers less, but that the coal consumption on the voyage to New York was 100 tons less, and the speed 1.72 sea miles per hour more. We give the Pall Mall Gazette paragraph and Messrs. Wilson's letter in full:

EXTRACT FROM THE PALL MALL GAZETTE, NOV. 6, 1900—THE COAL EATING WATER TUBE BOILER.

"In the course of a debate last session on the demerits of the water tube boiler as a steam generator for our large warships, Mr. Charles Wilson, M. P., the head of the Wilson line of steamships, mentioned that he was sending his steamer Martello on a 7,000 mile trial trip, in order to test the comparative merits of the water tube boiler and the old cylindrical boilers which had been taken out of the same ship. Mr. Wilson claimed at the outset that a saving in weight had been effected, as between the cylindrical and the water tube boilers, of 100 tons. The Martello's trip has been completed, and we learn that the results have been most unfavorable to the water tube boiler (which is not the Belleville). The coal consumption of the steamer, to produce the same results as the old cylindrical boilers, was higher by 16 tons a day, so that she burned on the trip 448 tons more coal than she had burned on a similar trip with cylindrical boilers. This represents so much more coal to carry on the voyage, and this 448 tons of extra coal completely swamps the economy of 100 tons in boiler weight saved. It is only fair to say that Mr. Wilson has a perfectly open mind on the question. This test is an evidence of it."

EXTRACT FROM THE PALL MALL GAZETTE, EXTRA SPECIAL EDITION, NOV. 8, 1900.

"Editor Pall Mall Gazette: Sir—We notice a paragraph in your issue of the 6th inst., referring to our steamship Martello, in which you stated that this vessel burnt 448 tons more coal on her voyage since being fitted with water tube boilers than she did previously with ordinary cylindrical boilers.

"This is quite incorrect; the coal consumption on her first voyage with water tube boilers being 100 tons less than the average of three years with ordinary boilers, and the speed is 1.72 knots faster.

"We think, in courtesy to us, you should have given us the opportunity of verifying your figures before publishing them, which we shall at all times be pleased to do, and we should be much obliged by your letting us know how you got this most inaccurate information. The ship is now on her second voyage, and we have every reason to believe that the performance will be improved. We may add that nine of our steamers are now fitted with Babcock and Wilcox water tube boilers."

Yours, etc., For THOMAS WILSON, SONS & Co., Ltd.
(Signed) CHARLES H. WILSON, M. P., Chairman.

ATLANTIC AND PACIFIC COASTS.

The new plant of the Townsend & Downey Ship Building & Repair Co. at Shooters Island, N. Y., launched its first vessel on November 24. The new vessel is a twin-screw dredging steamer of 1,000 tons displacement. The dimensions are: Length over all, 160 ft.; breadth of beam, 35 ft., and depth of hold, 16 ft. The frame is of oak and hacmatac planked with yellow pine and copper fastened. She will be sheathed with metal. The engines are two independent working of the compound type; the diameters of cylinders of each are 13 in. and 27 in., with 20 in. stroke of piston. Steam will be supplied by two Scotch boilers, each allowed a working pressure of 125 lbs. The propellers are 7 ft. in diameter each, with a pitch 8 ft. 6 in. She will be furnished with a powerful dredging plant by Joseph Edwards & Co. of New York. The plant will have a capacity of 400 tons of dredging per hour and will carry it to sea and dump it. She was built for the United States engineers department and will be employed in dredging the entrance and harbor at Sabine Pass, Texas.

On Friday of this week bids will be opened at the navy department, Washington, for the construction of five battleships and six armored cruisers. This constitutes the largest construction order ever given out by the government at a single time. The appropriation for the hulls and machinery of these vessels aggregates $42,000,000. According to the terms of the two acts under which the vessels are authorized only four of them can be guilt on the Pacific coast. It is expected that the competition for the construction of these eleven vessels will be very brisk. All week representatives of the great ship building companies have been in Washington in conference with the chief constructor. The Scotts of San Francisco have already declared that they want more than four ships—that is, they want to be placed on an equality with the eastern builders, and may appeal to congress.

The Pusey & Jones Co., Wilmington, Del., have signed a contract to construct a steel schooner-rigged pleasure yacht for Charles J. Canfield of New York, who has large lumber interests in Michigan. The craft was designed by H. C. Wintringham of New York city, and will be 125 ft. 10 in. long over all; 17 ft. 8 in. beam, molded, and 10 ft. 4 in. deep, molded. The yacht will be fitted with all modern improvements and conveniences. The hull will have four water-tight steel bulkheads.

New York Ship Building Co., Camden, N. J., laid the keel of its first steamer last week. It was laid under the direction of William B. Fortune and was witnessed by President Morse, Capt. Randall and other officials. The vessel will be a 3,000-ton steamer for the Pacific trade, and is being built for M. S. Dollar & Co., San Francisco.

A dispatch from Constantinople is to the effect that the Turkish government has placed an order with the Cramps of Philadelphia for a cruiser to cost £350,000.

CHRONICLE OF MAINE SHIP BUILDING.

The Review last week presented a list of merchant vessels which had been constructed during the year at the ship yards in the Waldoboro and Belfast districts in Maine. It is now enabled to amplify the list by additions from other Maine ship yards.

In the district of Bath the following vessels have been built:

	Tonnage.
Schooner Mary W. Bowen	1,907
Schooner Marie Palmer	1,594
Schooner Henry Weiler	334
Schooner Helen W. Martin	2,020
Schooner Calumet	1,094
Schooner Helena	504
Schooner William C. Carnegie	2,380
Schooner Maude Palmer	1,529
Schooner J. Edward Drake	789
Schooner Medford	1,160
Schooner Eleanor A. Percy	3,142
Schooner Louise B. Clary	1,998
Schooner John W. Dana	478
Schooner Clifford M. Carver	973
Ship Astral	3,150
Steamer Cohannet	34
Steamer Transfer, No. 14	189
Steamer Transfer, No. 13	189
Steamer Globe	62
Sloop George Leslie	21
Barge Iowa	1,473
Barge Black Diamond	795
Barge Elk Garden	749
Barge Benavides	819
Barge Norton	412
Barge Sharon	406
Barge Hampshire	735
Barge Georgia	1,488
Barge Bee	802
Barge Flora	769
Barge Indiana	1,506
Barge Grace	781
Total tonnage	34,282

Merchant vessels, now in process of construction at Bath are: A four-masted schooner and two large barges in Kelley, Spear & Co.'s yard; four-masted schooner in the New England Co.'s yard, steel ship of 3,150 tons in the yard of A. Sewall & Co.; four-masted schooner in the Houghton yard; four-masted schooner in Deering's yard; five-masted schooner in Percy & Small's yard; tug of 189 tons at Bath Iron Works; four-masted schooner at C. V. Minott's yard, Phippsburg. The total tonnage is estimated at about 14,000 tons.

In the Bangor district no new vessels were built this year, but the schooner C. B. Clark, 162 tons, rebuilt from schooner Dick Williams, is practically a new vessel. She is owned by F. W. Ayer & Co.

The district of Castine turned out the following:

	Tonnage.
Schooner Thallium	596
Schooner Edward T. Stotesbury	1,277
Schooner George C. Thomas	1,277
Schooner Grace	5
Schooner Golden Rod	9
Schooner Ethel M.	8
Schooner Torpedo	13
Total tonnage	3,185
Rebuilt, schooner Mabel	37

The four-masted schooner George C. Thomas, of 1,277 tons, will be launched in December at Verona, and the builders, McKay & Dix of New York, will, in 1901, build a four-master of 1,400 tons and a smaller schooner.

There were built in the district of Machias the following vessels:

	Tonnage.
Schooner Ninetta M. Porcella	466
Schooner W. R. Perkins	143
Schooner Luella	5
Sloop Startle	9
Total tonnage	623

A 325-ton schooner is on the stocks at Machias, and at Milbridge a 1,400-ton schooner is under contract, and one of 325 tons likely to be built.

The summary is as follows:

	Tonnage.
Bath district	34,282
Bangor district	162
Belfast district	7,373
Castine district	3,185
Machias district	623
Waldoboro district	8,586
Total tonnage	54,211

Various small craft built in districts other than those named will swell the total for the state to about 55,000 tons, which is about 10,000 tons in excess of the output in 1899.

In 1899 the various districts turned out new merchant tonnage as follows:

	Tonnage.
Bath	34,694
Belfast	5,945
Machias	1,598
Waldoboro	2,422
Various small craft	316
Total tonnage	44,975

There were also constructed at Bath last year 1,466 tons displacement and 3,654 tons net register of naval vessels.

There are now in process of construction in Maine yards, or under contract to be built, wooden merchant vessels, mostly large schooners, whose tonnage will aggregate 28,000, and negotiations are pending for contracts involving the construction of 12,000 to 15,000 tons more. In addition to the wooden fleet, A. Sewall & Co., at Bath, are building another steel ship, a sister to the Astral and to be named the Acme, of 3,150 tons, and may build other steel craft. The condition of the freight market is fairly satisfactory at present, although rates are not nearly so high as in the latter part of 1899, and there seems to be a general confidence among builders and owners that business will be good in the coastwise trade next year. Some of the big schooners are employed profitably in foreign trade, as, for instance, the big six-master George W. Wells has just completed a trip from Philadelphia to Havana with coal, and the Verona-built schooner Thallium has already made a trip to Greenland, bringing a cargo of the mineral known as cryolite to Philadelphia. Another Verona-built schooner, the Edward T. Stotesbury, is chartered from Philadelphia to Dublin with case oil.

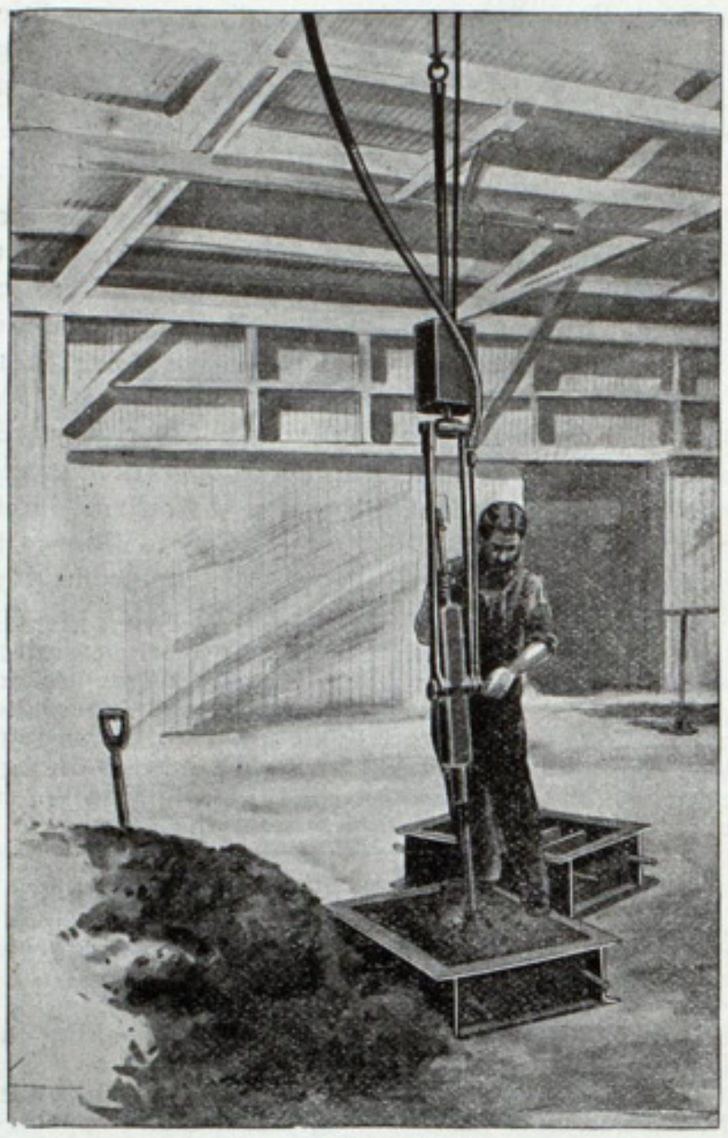
A new line of steamers, to be known as the Virginia line, to run from Norfolk and Newport News, Va., to London and Liverpool, will commence operations from this side about Dec. 15. The new line has established freight connections with the Chesapeake & Ohio railway, Southern railway and the Norfolk & Western railway. A fleet of six steamers, with capacities ranging from 7,000 to 11,000 tons, will perform the service, which will be about semi-monthly. The first two steamers to be dispatched will be the Rapidan, of 11,000 tons capacity, and the Wyandotte (late Lord Roberts), of 6,000 tons. The Powhattan and the Alleghany, sister ships, each of 6,800 tons capacity, which were recently launched, will be placed in this service. The agents of the new line are Furness, Withy & Co., Ltd., 361 Produce Exchange, New York.

The big, new steel steamship Wilkesbarre, built for the Lehigh Valley Transportation Co., was launched Saturday afternoon in the yards of the Union Dry Dock Co., Buffalo. Her length on the spar deck is 401 ft.; distance between perpendiculars, 381 ft. 6 in.; molded beam, 50 ft., and depth 28 ft. She will have a quadruple expansion engine, the respective cylinders having diameters of 20½, 30, 43½ and 63 in., and a stroke of 42 in. Steam will be supplied by three cylindrical boilers, each 12 ft. 6 in. in diameter, 11 ft. 6 in. long and capable of carrying 210 lbs. of steam.

Messrs. Frederick Leyland & Co., Liverpool, have contracted with Messrs. R. & W. Hawthorn, Leslie & Co., Hebburn, for the construction of a large cargo and passenger steamer. Engines of large power, with cylinders 27 in., 44½ in., and 76 in. by 60 in. stroke, and 200 lbs. pressure, will be fitted by the North-Eastern Marine Engineering Co., Wallsend-on-Tyne.

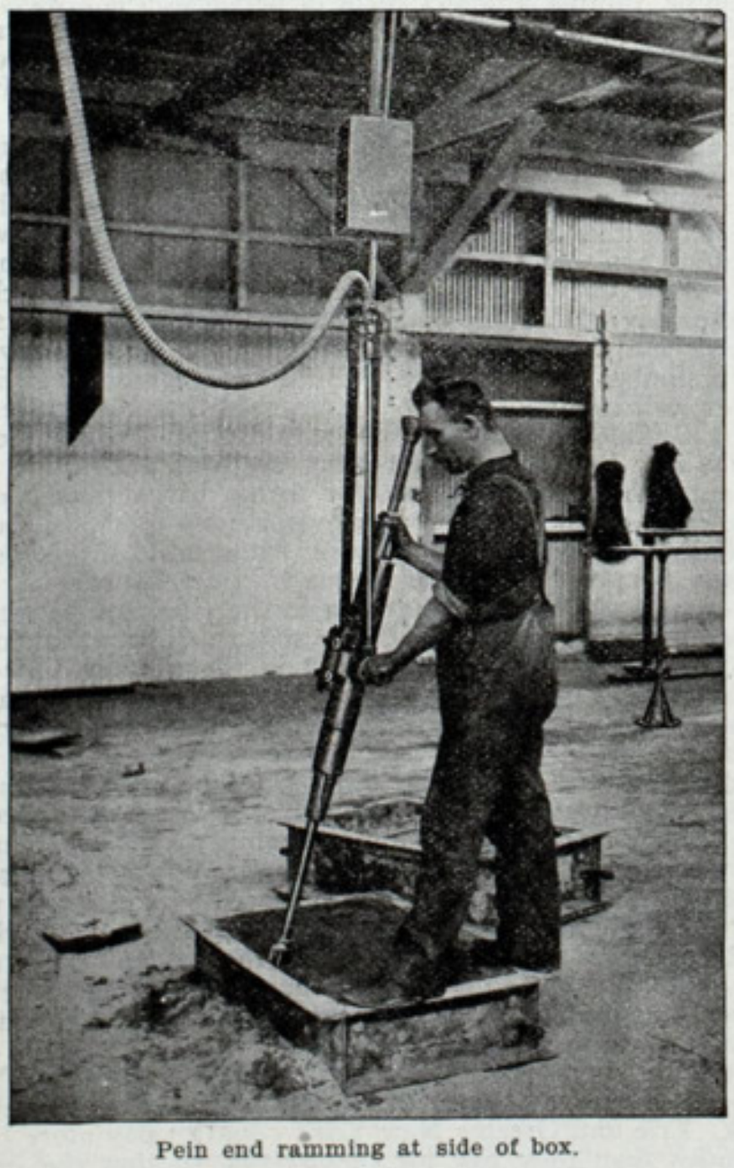
CHICAGO SAND RAMMER.

The accompanying illustrations give a succinct idea of the Chicago sand rammer recently placed upon the market by the Chicago Pneumatic Tool Co. This is another innovation in the application of compressed air, for which this company is responsible. It is simply an adaptation of the principle of some of their other pneumatic tools to this purpose. The rammer is, of course, made in varying sizes, but the standard size is



Butt end in ramming.

known as No. 4, being the one best adapted to the general requirements of the trade. The weight of the No. 4 rammer, with counter-balance, as shown in the illustration, is 290 lbs., of which the counter-balance weighs 130 lbs., leaving the weight of the rammer proper 160 lbs. When operated under an air pressure of 40 lbs. per sq. in., which pressure is found to give the best results, the rammer strikes about 300 blows per



Pein end ramming at side of box.

minute. The maximum stroke is 7 in., but the valve motion is such as to make it a variable stroke machine; that is, the further down the cylinder is pressed when the machine is in operation, the shorter the stroke becomes with a consequent increase in the number of blows per minute, and the further away the cylinder is held from the work, but, within the maximum stroke of the piston, the longer the stroke is with a consequent less number of but more forcible blows per minute.

These results are accomplished in the Chicago rammer by the employment of an auxiliary valve so arranged as to time the movements of the main valve, so that the piston will complete its full stroke before the main valve reverses to admit the fluid into the cylinder for the return stroke of the piston. The auxiliary valve is controlled by the piston by means of ports so located in the cylinder that the valve will be operated when the piston is at its shortest stroke, which is in the middle of the cylinder, where a groove in the piston will reciprocate across grooves in the cylinder on any desired stroke, from scarcely more than a vibration of the piston to a full stroke. After the groove in the piston crosses the lower groove in the cylinder, an interval of time is required for the piston to complete its full stroke and the auxiliary valve is so regulated as to occupy the same length of time in completing its stroke in order to reverse the main valve, which moves very quickly, and immediately after blow being struck on drill bit, admitting the fluid for return stroke of piston. In the return stroke the auxiliary valve is regulated to throw the main valve in time to admit the fluid into the top end of cylinder to cushion or check the piston from striking the top cylinder head. The machine works under the pressure stated, with absolutely no vibration, and is easily handled. The air consumption when operated under a pressure of from 40 to 50 lbs. per sq. in., is 20 cubic ft. of free air per minute.

It is estimated that more sand can be rammed in a given time and in a better manner by this machine, than can be done by five men doing

Rammer in horizontal position showing method of reversing ends.

hand work. The rammer is suspended from the ceiling in the ordinary manner, and requires but little room for its operation. This rammer is now successfully used in several leading steel foundries, and will be seen in a number of other places as soon as shipment of the rammers already ordered can be made. In this rammer the butt and pein ends are attached to the opposite ends of the piston, which extends through the cylinder of the machine. To change ends it is only necessary to revolve the rammer on its axis, as will be seen by referring to the illustration. In addition to the vast saving of time above referred to, the great advantage of this rammer lies in the fact that the operator is not required to exert any power beyond guiding the machine and varying the blow, rendering his task far less irksome and laborious than with the old method of hand ramming.

Plans for new terminal buildings and piers at Hoboken, to be the finest in the world, have been adopted by the North German Lloyd Steamship Co. A solid sea wall of granite and concrete is to be constructed along the entire front (900 ft.) of the company's property. On this sea wall or stone bulkhead a building, 850 ft. in length and 130 ft. in width, will be constructed of steel columns, filled with, and surrounded by, concrete held in place by iron jackets, brick sides, steel girders with brick arches as flooring, the second floor being of the same construction. The lower floor of this building will be used for the storing of cargo, and on the upper floor the passenger traffic of arriving and departing steamships will be handled. Three piers from which the steamers will sail will extend into the river. The northernmost of the piers will be 730 ft. in length for the present, ultimately to be lengthened to 910 ft., the second 894 ft. and the third 874 ft. long, the two first 80 ft. and the third 90 ft. wide.

The Dominion line has given a contract to Harland & Wolff, the Belfast builders, for three new steamers to be ready next spring. The steamers are to be built on the same lines as the Commonwealth, but even larger than the latest additions to the Dominion fleet. Two of the new steamers are to be put on the Boston service and the other will sail between Liverpool and Montreal.

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Secretary Long renews with emphasis in his annual report his recommendation that the bureaus of construction, engineering and equipment be consolidated. It will be remembered that Admiral Melville in his annual report opposed this consolidation, though it had been previously recommended to congress by the secretary. As Admiral Melville's remarks were given great prominence the secretary thought it necessary to reiterate his position. The fact of the matter is that these three departments overlap and this very overlapping is the cause of constant friction. The three bureau chiefs occupy positions of equal authority in the navy and each is disposed to pursue his jurisdiction to the last fraction of a hair; and each is constantly on the alert to see that the other does not encroach upon his domain. This latter point is not always easily settled, since it is difficult at times to determine where the province of one ends and where the other begins. Were these three departments placed under one head there could be no clash of authority. As it is each one wants more than he can have. Following is the recommendation of the secretary:

"The recommendation heretofore made that the organization of the navy department be simplified by the consolidation of the three bureaus of construction and repair, steam engineering and equipment is renewed. Under the present system, from the inception of its design until completed and placed in commission, the plans and specifications of a naval vessel are in the hands of three bureaus, each with a distinct organization, each having exclusive jurisdiction within certain lines, and all charged with the duty of carrying on work within, but not beyond, their respective provinces, as nearly as may be at the same time. Such a system is, in practical administration, cumbrous and expensive, and from its very nature tends to develop controversies respecting the scope of each bureau's duty and to occasion friction, delay and want of harmony in doing whatever approaches border lines of jurisdiction. It is to the credit of the officers in charge of the bureaus concerned that work upon ships now under construction has been carried on without more friction; but the system itself is none the less objectionable, and is a source of inconvenience, delay, largely increased cost and occasional confusion. The present divided organization is the outgrowth of conditions which no longer exist. The hull, the propelling machinery and the articles of equipment of a modern steamship no longer constitute simple, distinct and separable elements in construction, but, on the contrary, in their multiplicity of details are so interwoven as to render embarrassing their supervision by three sets of independent administrative officials. The union of these three bureaus, the chief function of which is to deal with the material of the ship, into one bureau, which might appropriately be called the bureau of ships; the consolidation of their several corps of assistants and inspectors, and the conduct of the really integral work of building and equipping vessels, under the management of one responsible chief instead of three chiefs, would promote the efficient and economical administration of this important part of the busines of the navy department. A chief of bureau is practically an assistant secretary. The proposed consolidation would not only reduce three of these assistants to one, but in like manner reduce the supervising, mechanical and clerical forces in every navy yard, and thus save great and unnecessary expense. At present each of the bureaus in question has at each yard its separate shops, inspectors, foremen and workmen, all often doing the same kind of work. No private business is run on such a wasteful and inharmonious plan. I renew the recommendation in this respect of my last annual report."

The moving factor in the shipping bill is Senator Frye. The great element of strength in the measure is Senator Frye. The bill is of his blood and bone and sinew. It is the epitome of his moral conviction. It was conceived in his brain and is rooted in his conscience. It partakes of that sterling quality of his character which has made him exercise a natural empire over his colleagues in the senate. The refutation of any ulterior motive in the bill exists in Frye himself. He is so toweringly above suspicion that through the very force of his integrity he carries the bill to the high plane of statesmanship. He has devoted the ripest years of his public career to this measure. It represents the fruit of his thought. He has been a capable and profound student of shipping. He has sought to unravel the causes for the decline of American shipping and he has endeavored in this bill to provide a remedy. He has seen clearly how necessary to the development of the nation is a merchant marine. Great as this country is, the world is greater. The great body of people live over the seas. To reach this innumerable market ships are necessary and they must be built and operated as cheaply as their rivals. If they are not they are merely junk. Trade always follows the path of least resistance. The consumer will always buy at the lowest price. At present an American ship cannot be built or operated as cheaply as a foreign ship. The purpose of the subsidy is merely to equalize these conditions as much as possible. It is intended to give the American shipping interest a chance to get upon its feet. It is not seeking favors. It is merely seeking an equal chance.

While it seems to be a most unusual proceeding it seems to be pretty well founded that the Turkish government will settle that claim of $100,000 for the indemnity of American sufferers in Armenia through the Cramps. That government has given the Philadelphia firm an order for a cruiser to which will be added a sum sufficient to extinguish the indemnity. Which is an essentially Turkish way of doing things. In this way there will be no direct dealing with the Turkish and United States governments. It is understood that the state department will make no protest against this form of settlement, being concerned merely in seeing that the American claimants obtain the money which is due them. This method of procedure will probably enable Turkey to cling to the delusion that it has ignored the American demand. No nation deceives itself like Turkey. Nothing illustrates better the extent to which this self-deception is carried than the state of its navy. Recently when it desired to fit one of its cruisers with armor it was found that the armor had to be carried to the ship, as the vessel could not get up steam enough to go to the ship building works. In the late war with Greece it was found that one of the Turkish cruisers had not been fitted with engines owing to an oversight. The "oversight" probably consisted in purloining the money which had been appropriated for the completion of the cruiser.

NEW CANAL MOVEMENT.

FRIENDS OF "OLD ERIE" IN NEW YORK STATE HAVE BEGUN ANOTHER CAMPAIGN FOR IMPROVEMENTS—ENTHUSIASM IN BUFFALO.

Buffalo, Dec. 5.—It ought to be good news all along the lakes that the new canal movement here is getting along as well as it is, for it is not denied that the enemies of the movement, backed as they are by railroad money and influence, have been very ugly of late and appeared to possess more confidence than ever before. Besides, the raising of $62,000,000 in a lump seemed a big proposition to everybody, till it was figured out where the money was to come from, so the friends of "Old Erie" started out with the conviction that they had work ahead of them. The progress already made is something to be very proud of. If there are any faint hearted ones on that side now, they are not betraying their feelings.

The Buffalo Merchants' Exchange took the lead and began well by engaging as special secretary George H. Raymond, who knows more of the canal and its claims to support than most of us and is not afraid to fight if need be, though a milder form of persuasion is always taken from choice. Mr. Raymond was one of the first to make it plain that there was something to urge besides the grain interests as in need of the canal, and now all advocates of canal improvement are with him. It is felt that the iron interest really depends more on the canal than the grain interests ever will again and there is a wave of enthusiasm arising from that direction that promises to sweep the grain interests fairly out of sight. It was this need of the iron smelters present and to be on the shores of Lake Erie alone that far-seeing canal men have had in view for a considerable time, and which has made canal enlargement an imperative matter. Andrew Carnegie acknowledged this need in his characteristic way the other day when he subscribed $1,000 to the Merchants' Exchange fund for carrying on the canal campaign. James J. Hill saw it when he put down a similar amount. The subscriptions are not wanting, and the campaign is well started. Still it is confessed that the entire work must be done by Buffalo and New York, with Buffalo leading, for the canal counties are idly looking on, and other sections are falling in with the railroad opposition, foolish as it is, for with a barge canal along the line of the Erie canal of today, there will never be any doubt of the supremacy of the Buffalo-New York transportation route or of the lakes being able to hold their present lead. This means to the railroads just what it did when the canal was first constructed, a further increase of wealth and influence among the canal counties of the state, a district that has, from the early days of the canal, been the richest in the country. The roads will get a great harvest from them, if they do not get it quite all, and they will not be in any danger of losing the supremacy of the route, as will certainly be the case if it is left to the roads alone.

Already there are capitalists looking to the possibilities of a canal that will carry cargoes of about 1,500 tons. "We want a fleet of barges there just as soon as they are made a possibility," one of them said a few days ago, when discussing the views of the leading capitalists west of us, as shown by their contributions. It is declared by canal men that a barge canal will line the entire route from Buffalo to New York with iron furnaces, and it appears that Major Symons, the resident government engineer here, shares the same view, for he has been saying something to the same purport in New York. As he was the expert on the canal commission last year his opinion is of the best.

Of course it is not a new showing that Buffalo and New York should be able to command the support of non-canal counties from a mere tax standpoint. Erie and Greater New York counties pay more taxes for the other counties than they pay for themselves, so that the great bulk of these other counties receive more from the state than they pay to it. Then why not aid these two counties, so that they can do still more?

JOHN CHAMBERLIN.

A marine engine draftsman is wanted by the Petersburg Iron Works Co., Petersburg, Va.

SHIPPING BILL UNDER DISCUSSION.

IT HAS THE RIGHT OF WAY IN THE UNITED STATES SENATE—THE SITUATION IS A HOPEFUL ONE.

Congress convened on Monday for its short session and the first thing which the senate did was to grant the right of way to the shipping bill. This augers well for the passage of the measure, though it will have by no means plain sailing. Senator Frye, the author of the bill, called it up and asked for its immediate consideration, which was granted by a party vote. He addressed the senate in explanation of the bill. His statement was elaborate and at times eloquent. This great maritime nation, he said, was placed in a position humiliating beyond expression by the present condition of our merchant marine. With a boundless sea coast, unparalleled and unapproachable natural resources, ship builders the equal of any in the world, the greatest exports in the world and every other argument in our favor, the United States had permitted its commercial rivals to seize the pathways of commerce and hold them practically to the exclusion of this country. Last year of all the enormous exports and imports of the United States only 9 per cent. was carried in American bottoms, and the United States paid to foreign nations (principally Great Britain and Germany) $500,000 a day for doing carrying trade work for this country. He pointed out that during the war with Spain the United States was forced to search the seas over for auxiliary cruisers and transports because we had sacrificed our carrying ships.

"The world," Mr. Frye declared, "has entered upon a fierce commercial war, and it is to be a long and strenuous conflict. Each nation is seeking the advantage of its rivals in this conflict, and is pressing forward to gain that advantage. Most of the foreign nations are looking for commercial advantages in the east. Russia, France, Great Britain, Italy and Germany are paying an aggregate of $5,000,000 per year in subsidies for the carrying ships of the eastern trade."

He pointed out that under present conditions it costs the United States from 40 to 80 per cent. more, principally in wages and food, to operate its ships than it costs Great Britain, and about 80 per cent. more than it costs Norway, and yet the United States is forced to compete under such a handicap with the encouraged and protected ships of foreign countries.

Mr. Frye discussed at some length the question of export bounties and discriminating duties, maintaining that export bounties were impracticable, and that in the matter of discriminating duties the United States would encounter no less than thirty-one different treaties. These would have to be abrogated if discriminating duties are enforced. The abrogation of these treaties would be an offense to every nation involved.

"Our relations with European countries today," said he, "are most amicable. Do you think it wise to disturb these relations at this time?"

Mr. Frye said he could see no reason why any man should favor free ships as a remedy. In this connection he referred to the ship yards of the United States, and expressed the opinion that a great maritime nation like this might as well be without a constitution as to be without ship yards. Mr. Frye showed how much greater was the cost of building and operating ships under the American flag. If these expenses were not greater, he said, there would be no excuse for the pending bill, and its foundation would fall. He presented, therefore, an array of figures to prove that it cost not only more to construct American ships, but more to operate them after they were built than foreign ships. His figures indicated that ships of Great Britain had an advantage of from $4.50 to $5 per gross ton over American ships in the expense of construction and operation. He related the incident cited by Mr. Clyde, of the Clyde Steamship Co., before the commerce committee of the operation of a ship under the Norwegian flag and an exactly similar vessel under the American flag. The expense of operating the Norwegian ship, he said, was just half that of operating the American ship between the same ports. Mr. Frye also referred to the line of vessels run by the late John Roach from New York to Brazil. They came into competition with a line of Spanish ships exactly similar in size and speed to the American ships. The Spanish vessels had a yearly advantage of $120,000 over the American ships, and could make money carrying freight at $5 per ton, while the American vessels, in order to make money, had to charge $7.50 per ton. Mr. Roach was forced to sell the line of vessels, and Mr. Thurber and the other purchasers of the ships eventually lost their entire investment.

Senator Frye is now hopeful that a bill can be agreed upon that will pass. The situation at present is indeed encouraging.

OPINIONS UPON THE SHIPPING BILL.

Below are given additional opinions of senators and representatives upon the shipping bill. It will be found that the bill is favored by members from all parts of the union, showing that it is by no means a coastwise measure, but is one of great general interest.

SENATOR BURROWS OF MICHIGAN.

"I believe that laws affecting our merchant marine and the construction of a canal connecting the Atlantic and the Pacific will be passed at this session; that these measures will in some form be enacted into law. As to the bill commonly called the shipping bill, I think that something ought to be done by congress to build up our merchant marine. It is unquestionable that this great nation should send its commerce abroad in its own ships. We ought to have a merchant marine large enough to carry American commerce under the American flag to every foreign port. What plan may prove the wisest and best calculated to consummate this purpose is to be carefully considered, and there is no reasonable doubt as to the ultimate result."

SENATOR THURSTON OF NEBRASKA.

"I feel that we certainly ought at least to make some experiment to see if we cannot build up our merchant marine, and if other great governments are accomplishing that end by subsidies it is a condition and not a theory that confronts us, as Cleveland said. But the session is so short and the opposition will probably be so strong, and there will be so much discussion in the senate, that the bill may fail for want of time."

SENATOR M. A. HANNA OF OHIO.

"The bill certainly ought to be passed, and I believe it will be. It is a bill which has been indorsed by the national platform of the Republican party and by the president in his messages. Its enactment is asked by chambers of commerce, boards of trade, maritime exchanges and by commercial interests without exception. If the demand for a new law means anything there ought not to be any delay in passing this bill. Personally, I am going to fight for it. I believe that the Republican senators and Republicans generally favor it and I know a great deal of money is spent every year for objects far less worthy than the development of our merchant marine. In our system of government the merchant marine is the one gap not fully protected and I think the time has come when we should afford all possible aid."

SENATOR McCOMAS OF MARYLAND.

"I think the shipping bill will pass during this session. The bill will be pressed for early consideration and vote, and I think that a conservative measure will be agreed to by the two houses."

SENATOR WILLIAM E. CHANDLER OF NEW HAMPSHIRE.

"I favor the immediate passage of the Frye bill for the upbuilding of the American merchant marine."

REPRESENTATIVE STEELE OF INDIANA.

"I do not think there is much doubt concerning the passage of the shipping bill during this session. The intention is to get this measure before the house as early as possible. It is a bill that ought certainly to pass. It will encourage the American ship building industry and increase the number of American ship owners. The proposed subsidy to be expended by the government according to the provisions of the bill will apply to mail steamers as well as vessels engaged solely in carrying export trade. We have already increased our coastwise trade under existing law, but we have not increased our foreign shipping industry, and this bill is being pushed for the reason that it will afford encouragement to our trans-oceanic commerce in American ships and at the same time guarantee vessels to the government to be used in case of war, both as fighting ships and in the transport service. I want to say in this connection that there is a widespread demand for the passage of this bill. There is just as much interest being manifested in the proposition in the state of Indiana as there is in New York or any other coast state."

AN ISTHMIAN WATERWAY.

The report of the isthmian canal commission, just submitted to congress, gives as the unanimous conclusion of that body that "the most practicable and feasible route for an isthmian canal, under the control, management and ownership of the United States, is that known as the Nicaragua route." The commission estimates the cost of this route at $200,540,000. This estimate is much in excess of any heretofore made, and is due to increased dimensions and other features not heretofore considered. The commission also estimates the cost of a canal by the Panama route at $142,342,579, according to one route, or $156,378,258 according to another route. As between the Nicaragua and Panama route the commission sums up a number of advantages favorable to the former. It states also that under the concession given by the government of Colombia to the Panama Canal Co. that government is not free to grant the necessary rights to the United States except upon conditions made by the company.

The report is a document of about 17,000 words, almost as long as the president's message. Although the work of the commission is not yet completed, many of the field parties still being out, yet it has been sufficiently advanced to make it practicable to present this preliminary report giving the essential findings. A thorough investigation has been made, not only of the Nicaragua and Panama routes, but of other possible routes, the commission keeping in mind the industrial, commercial and military value of an inter-oceanic canal, and also the rights, privileges and franchises necessary to be secured for the construction of a canal under the control, management and ownership of the United States.

In all thirty-one working parties were organized and sent into the field, making a force of about 220 engineers and assistants, besides about 600 laborers, boatmen and other workmen employed in the various countries, a total of more than 800. Meanwhile, the members of the commission personally conducted various branches of the work. One party went to Paris, where they examined the details of the Panama canal project now being executed by the French company.

A detailed description is given of the trip over the several routes. Along the Nicaragua route it was found that the short section of partially constructed canal is perhaps in as good shape today as it was when the work was stopped. The buildings, however, are all rotten, and the dredges, boats, etc., are worthless.

The commission visited President Zelaya and other leading officials of Nicaragua and found them greatly interested in the project. The occupation of their territory by the United States for canal purposes did not seem to be regarded as a serious obstacle, provided the sovereignty of the republic was respected. Along the Panama route, the commission found a large force of workmen engaged upon the canal line, about 2,000 in number, according to the Panama company. The canal had been opened to some extent at both ends. Immense quantities of machinery, implements and tools were found along the route. Much of this property, the commission reports, is ill adapted to American methods of work and all of it is now from thirteen to twenty years old, so that no value should be given to the plant now on the isthmus. A visit was also made to President Iglesias of Costa Rica, and his cabinet, and a strong sentiment found to exist for an American canal along the Nicaragua route. Trips were also made along the Darien route.

After going over the several routes the commission considered the dimensions of the canal to be built. Having in mind the increasing size of ocean-going vessels, it was determined to fix upon a depth of 35 ft. at mean low water and a bottom width of 150 ft., with some increase of dimensions at certain points. These dimensions are larger than those proposed for any previous canal scheme. While they may seem excessive today, the commission points out that the canal is not likely to be opened within ten years, during which time the increase in maritime dimensions is likely to continue. A width of 150 ft. will allow all but the very largest ships to pass each other in the canal, while the locks are of a dimension to permit even the largest ships afloat to be maneuvered. The size of locks is 740 ft. length, 84 ft. width in the clear, with a depth of 35 ft.

The commission then compares the Nicaraguan and Panama routes and decides in favor of the former.

ELECTRIC STEERING GEAR.

THE APPLICATION OF ELECTRICITY TO AUXILIARY MACHINERY ON SHIP BOARD—DESCRIPTION OF A STEERING GEAR.

The waste of steam in the auxiliaries of the modern steamship has recently been the subject of much serious thought and careful investigation on the part of ship builders and ship owners. The fact, as shown by Mr. W. W. White, Past Assistant Engineer, in the Journal of the American Society of Naval Engineers, that a modern vessel like the United States cruiser Minneapolis was found to require 23 per cent. of the daily coal consumption to run the auxiliary machinery, demonstrates the necessity of improved practice in the construction and operation of these auxiliaries. One of the solutions of the problem has been found in the substitution of electric motors for the small engines, the current for these motors being generated with relatively large and economical steam engines located close to the boilers.

The Electro-Dynamic Co., Philadelphia, appreciating the fact that electric transmission is especially adaptable to this class of work, has, for a number of years, been making a careful study of the subject. Its officers are the consulting electrical engineers for several of the large transatlantic lines, and the company has furnished the generating sets, ventilating motors, forced draft motors, etc., for many of the ships recently built. In addition to these simpler applications, some of the more difficult problems of ship practice have been solved. The company's steering gear is one of the most successful electric steering gears now on the market.

That this steering gear is a success is demonstrated by the fact that, after being carefully investigated by numerous experts, it has been specified for the following vessels:

Gromoboy, built in St. Petersburg for the Russian government.
Osliabia, built in St. Petersburg for the Russian government.
Pallada, built in St. Petersburg for the Russian government.
Alexander III., built in St. Petersburg for the Russian government.
Pobieda, built in St. Petersburg for the Russian government.
Peresviet, built in St. Petersburg for the Russian government.
Variag, built in Philadelphia for the Russian government.
Retvizan, built in Philadelphia for the Russian government.
Hull No. 312, built in Philadelphia for the International Navigation Co.

Moreover, this steering gear has steered the famous Russian cruiser Variag, speediest of her class, on her trial trip of July 26, 1900, with the remarkable results already noted in the Review.

In addition to the feature of fuel economy, the apparatus has many other features of desirability. The device is thoroughly protected by patents, the patentee being Mr. M. Pfatischer, who has been chief engineer of the Electro-Dynamic Co. for many years. In the development of this steering gear, the company have been associated with the well-known firm of Williamson Bros. of Philadelphia, makers of steering machinery of all kinds. For ships built in the United States Messrs. Williamson Bros. manufacture the mechanical details of the equipments.

PRINCIPLE OF OPERATION.

If we prepare two equal resistances and connect them in parallel to a source of electrical current, the current will flow equally in both

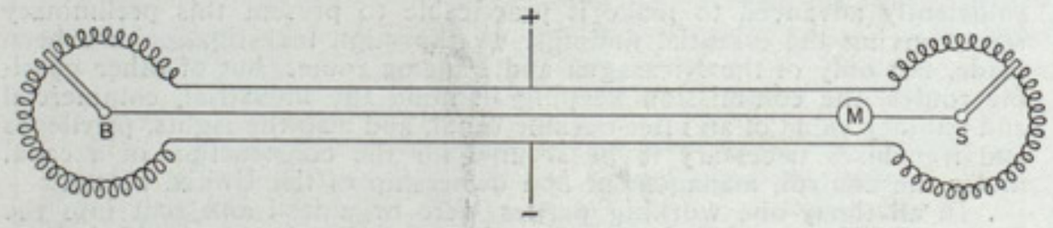


Fig. 2. Elementary diagram.

(Fig. 2). Suppose now we provide two swinging contact arms, one to make contact at different points on each resistance. If we connect these two arms by a wire with an ammeter M in the circuit, we shall find that as long as the two arms make contact at corresponding points on the resistances, no current will flow in the connecting or "balancing" wire.

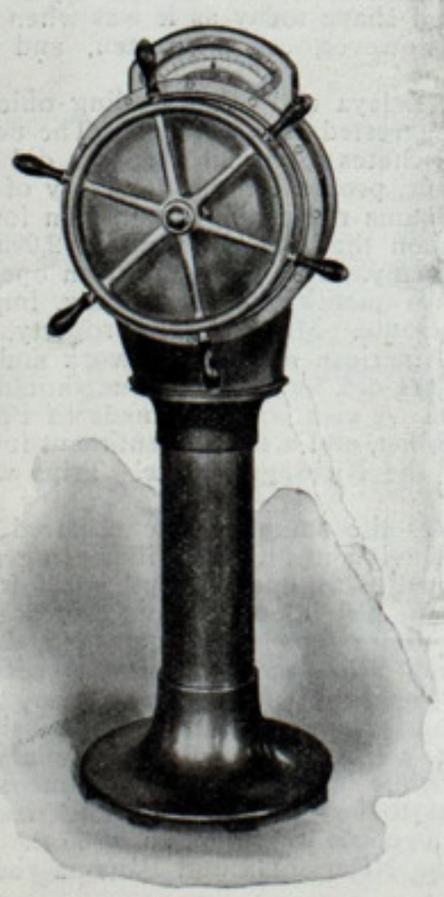


Fig. 3. Steering column.

If, however, we move the contact arm of B to a new position a current will immediately commence to flow in the balancing wire, and will continue to flow until the arm S is moved to a new position corresponding exactly with the new position of B. The direction of the current in the balancing wire will depend upon which way the contact arm B is moved, and the volume of current will depend upon how far the arm is moved around the circuit. In the above description all electricians will recognize the principle of the Wheatstone bridge, very generally used in electrical measuring instruments of today.

The peculiar adaptability of this principle to a steering gear will be quickly appreciated. If, instead of an ammeter, we place in the circuit of the balancing wire an electric motor capable of running either way, and connect the motor by mechanical means to rotate the contact arm S, current flowing through the balancing wire will operate the motor until the position of the arm S corresponds to the position of the arm B, when no current will flow, and the motor will stop. Any change in B will be followed by a similar change in S.

If this principle could be applied to the steering gear without the introduction of other elements, the problem would be a very simple one. For a number of reasons, however, this is not practicable, the principal reason being that the currents continually flowing in the resistances would be excessive. This, and many other difficulties, had to be overcome before a practical steering gear was devised. In the apparatus described below, it will be seen that the principle is applied, but modifications have been made which overcome all difficulties in a simple and thoroughly practical manner.

In the wheel house is a neat and substantial pedestal of brass supporting the wheel (Fig. 3). Within the pedestal is one of the resistances indicated in the diagram (Fig. 2), also a convenient form of contact plate and the sweep making contact thereon. Suitable gearing is provided so that the sweep is rotated by the wheel. This gearing is so proportioned that the wheel makes ten turns in throwing the rudder from hard-over to hardover. This pedestal is known as the steering column.

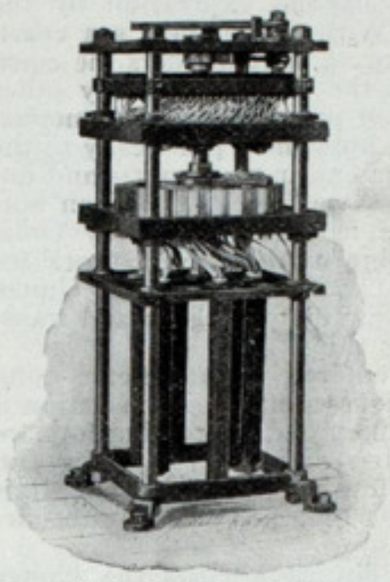


Fig. 4. Rudder column.

Close to the helm is located a frame supporting another resistance with its contact plate (Fig. 4). The resistances in this column are placed in the frame with more space between them than in the steering column. This gives more thorough ventilation and facilitates inspection. A water tight case surrounds the upper part of the column and protects the contact plate. The illustration (Fig. 4) shows the column with this case removed. The sweep of this rudder column is connected to the helm so as to move as the rudder moves. The resistances of both the rudder and steering columns are supplied with current from the dynamos of the ship, or from an independent source. The sweep of the steering column is connected electrically to the sweep of the rudder column by a small wire.

In the dynamo room is placed a motor-driven generator (Fig. 5) with an exciter attached to the same shaft. Fig. 6 shows the exciter driven by a separate motor. The fields of the exciter are in the circuit with the balancing wire, connecting the steering resistance and the rudder resistance. The motor, driving the generator and exciter, receives current from the dynamos of the ship.

By the suitable arrangement and proportions of generator and exciter the effect of the small current flowing in the balancing wire is multiplied and sufficient power to drive the rudder motor is obtained. A motor, sufficiently powerful to turn the rudder under all conditions of service, is located in the stern of the ship and geared to the helm so as to move it in either direction, as required (Fig. 7).

The apparatus indicated in Figs. 3 to 7, inclusive, together with the wires connecting the different devices, constitute the entire electrical equipment for steering a ship. The motor can, of course, be adapted to whatever method is preferred for securing and moving the rudder. The

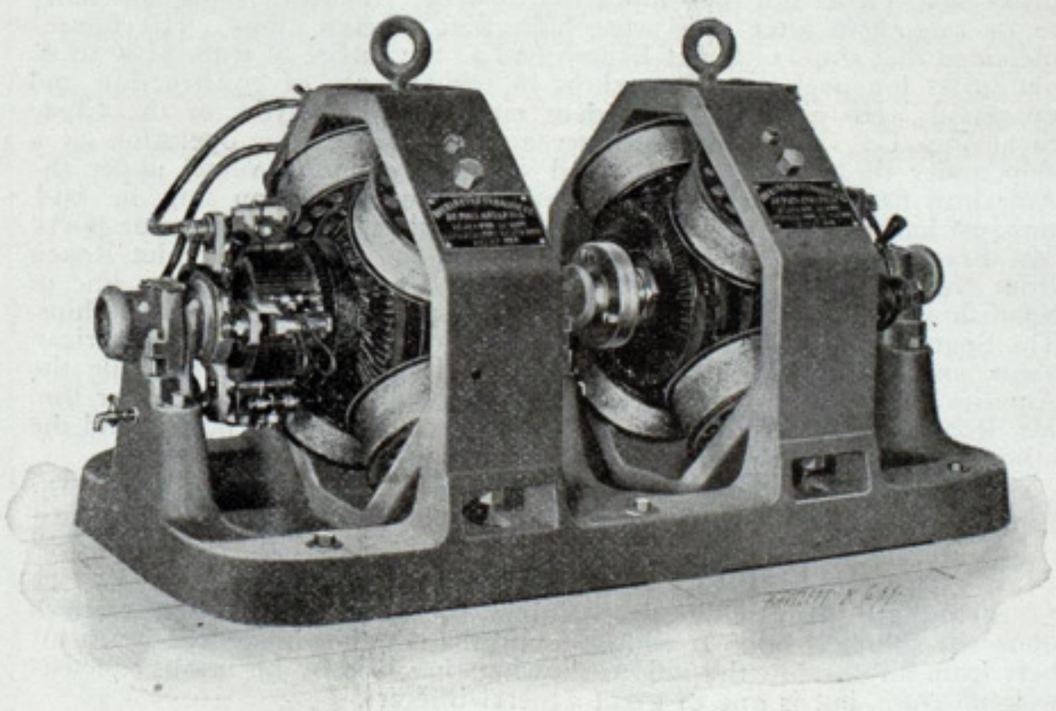


Fig. 5. Motor-driven generator.

two cables which carry the current from the generator to the rudder motor are large enough to transmit the necessary power for moving the rudder; the remaining wires are very small and few in number. The apparatus is subject to certain modifications to suit the requirements existing on different ships. The best equipment can be determined after the conditions have been submitted to the company. For the Gromoboy, Peresviet, Pallada and Pobieda, the equipment indicated in the illustrations, already mentioned, is used, the exciter being mounted on the extended shaft of the generator. For the Variag a steam engine was substituted for the motor to drive the generator. This arrangement is indicated in Figure 8.

In some cases it is desirable to have the steering gear entirely independent of the other electrical apparatus of the ship. For such a case the exciter apparatus illustrated in Fig. 6 is coupled to the engine-driven generator (Fig. 8), and all the power necessary for steering the ship is taken from one engine. When such an equipment is used suitable provision is made for uncoupling the exciter, and steering the ship with power from one of the lighting generators, in case of an emergency.

Let us now consider how the apparatus operates. If the man at the wheel desires to change his course, he manipulates his wheel exactly as he would if it were connected directly with the rudder. The movement of the wheel varies the position of the sweep of the resistance in the steering column. This starts a small current flowing through the bal

ancing wire and the fields of the exciter. This current is multiplied in the manner indicated above and power is transmitted to the rudder motor, thus causing the motor to turn the rudder. The rudder will continue to move until the sweep of the rudder column is moved to a position corresponding with the position of the sweep of the steering column, when current will cease to flow in the balancing wire and the generator and rudder motor will cease to function. The rudder will therefore assume a position corresponding with the sweep of the steering column. During this time the motor driving the generator and exciter has had to do work proportional to the power required of the generator and also a slight amount of work necessary to rotate the two armatures. When current ceases to flow through the balancing wire no power is required except the friction load of driving the generator and exciter armatures in dead fields. This power is, of course, very small. The method of multiplying the effect of the current in the balancing wire makes it possible to

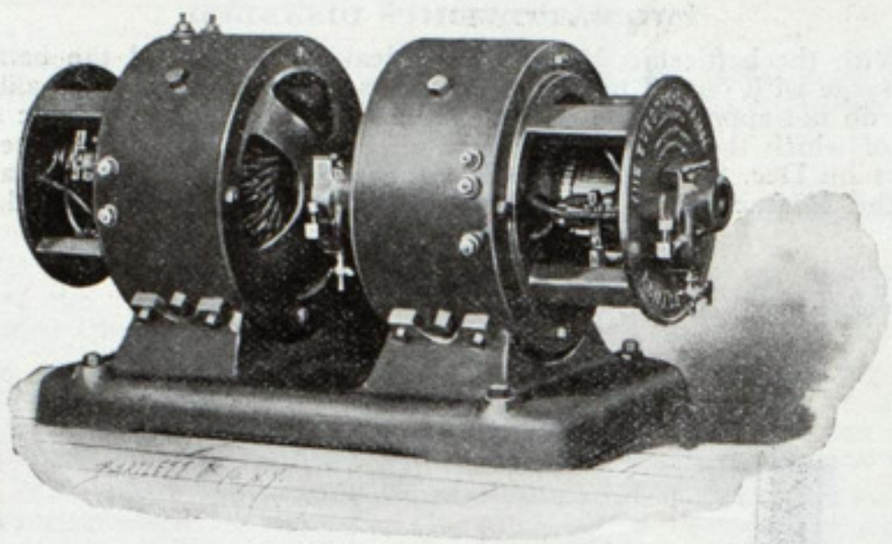


Fig. 6. Separately-driven exciter.

use very small currents in the resistances, these currents being about two amperes each, not enough to operate four incandescent lamps.

That the man at the wheel may always know how the rudder is responding to his wheel, a rudder indicator is mounted on or near the steering column. The column illustrated in Fig. 3 shows the indicator mounted upon it. A second divided resistance is located on the rudder column and the movement of the rudder shifts the sweeps of both resistances simultaneously. A very small current through the second resistance is transmitted to the indicator and moves the pointer of the indicator to correspond with the movement of the rudder. The scale of the indicator is indexed so that the pointer moves one degree on the scale for each degree of arc of the rudder and the pointer and rudder at all times correspond in position.

PECULIAR ADVANTAGES OF THE SYSTEM.

The speed of a motor depends upon the voltage. If the wheel is turned rapidly, current at a relatively high voltage is delivered to the motor and the motor moves quickly, turning the rudder quickly. If the hand wheel is moved slowly it starts action slowly in the exciter and generator, and the rudder motor will move slowly. It will thus be seen that the control of the rudder is just as exact as if the hand wheel were connected directly to it. It was no small task to design motors and dynamos capable of functioning so exactly as this and capable of being

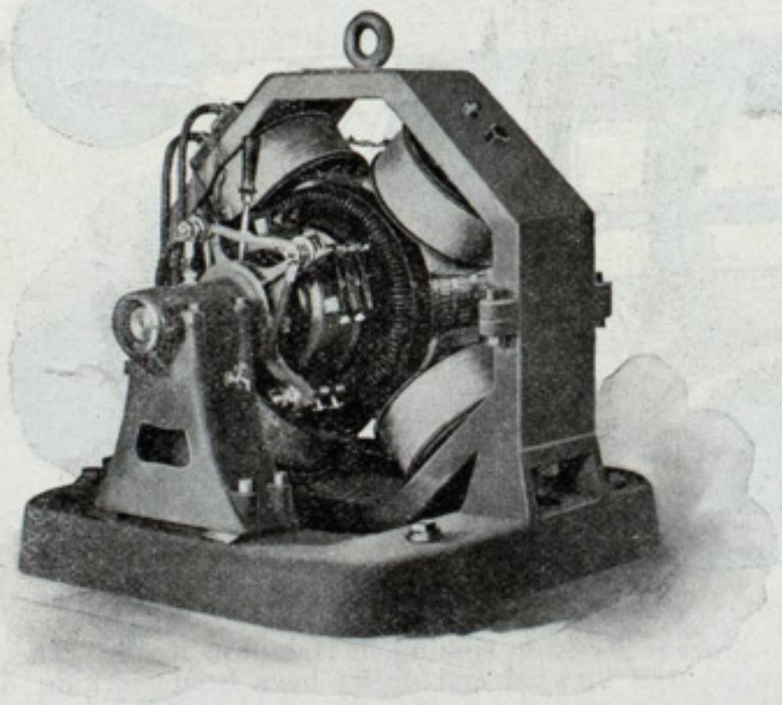


Fig. 7. Rudder motor.

suddenly reversed under varying currents. It is one of those things which look simple after some one has shown how to do them. The motor of the steering gear can be reversed from full speed in one direction to full speed in the other direction in about four seconds.

All electric circuits are constantly closed, consequently there is no sparking in any part of the gear or controlling apparatus. Dynamos are ordinarily located in a room close to the boilers. The generator for the steering gear is operated by the same man who operates the lighting machines. When designing equipments for new vessels the company recommends a consolidation of all generating apparatus for lighting and power, including the steering equipment. Wires can be run through water-tight bulkheads with much greater facility than can steam pipes and may easily be bent any number of times. These wires cost less than half the price of copper steam pipes ordinarily used for steering engines. The system is silent, and being well balanced does not cause any vibration to the ship. The use of the electric steering gear does away with heat and therefore increases the value of large spaces in the ship, both for cabins and for cargo. The simple nature of the apparatus used reduces to a minimum any possibility that it will get out of repair. No adjustments have to be made after the apparatus is set up. It can therefore be installed by any intelligent electrician. The working currents are in short and well-protected mains. The controlling currents are very

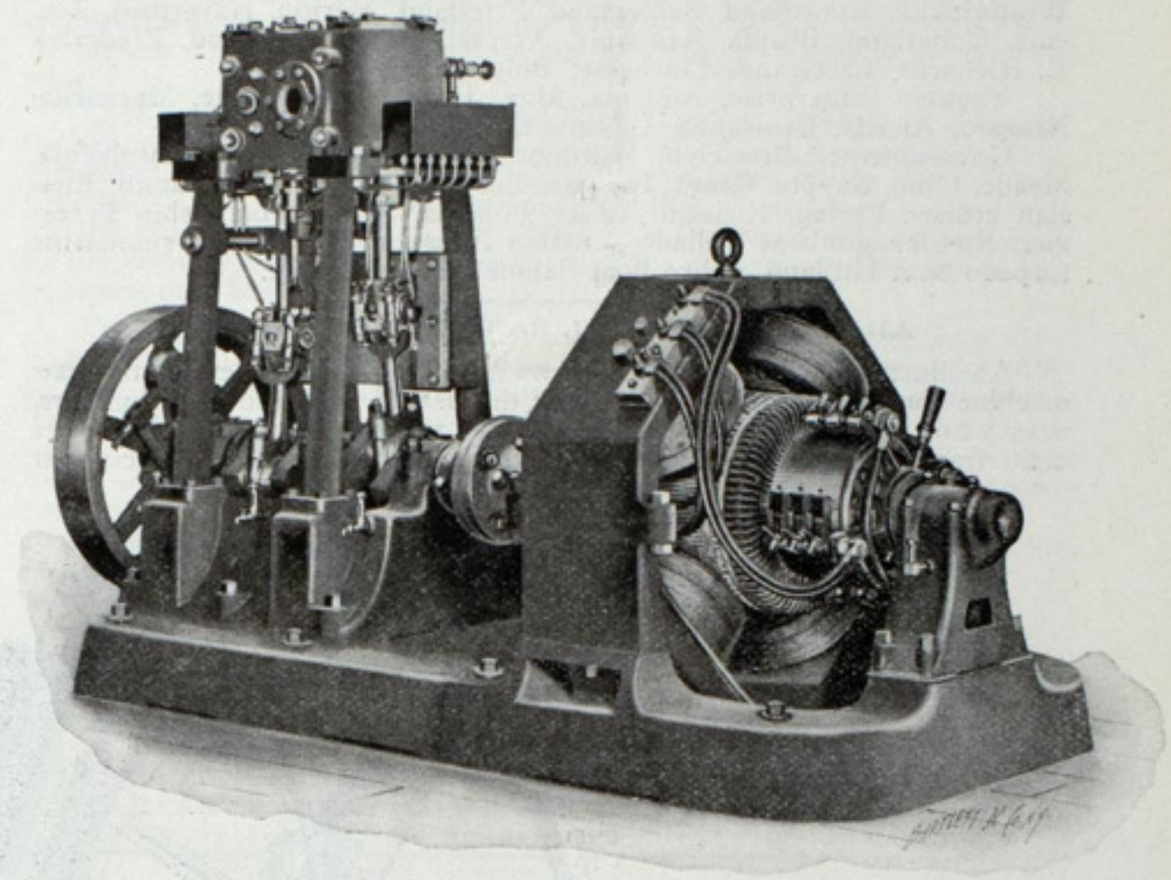


Fig. 8. Engine-driven generator.

small, and none of the currents necessary can possibly affect the navigating instruments of the ship.

Only five small wires (including the rudder indicator wires) are carried to the steering column. It is thus feasible to establish a number of stations on the ship from which the rudder can be operated. A steering column at any one of these stations can be placed in service by changing

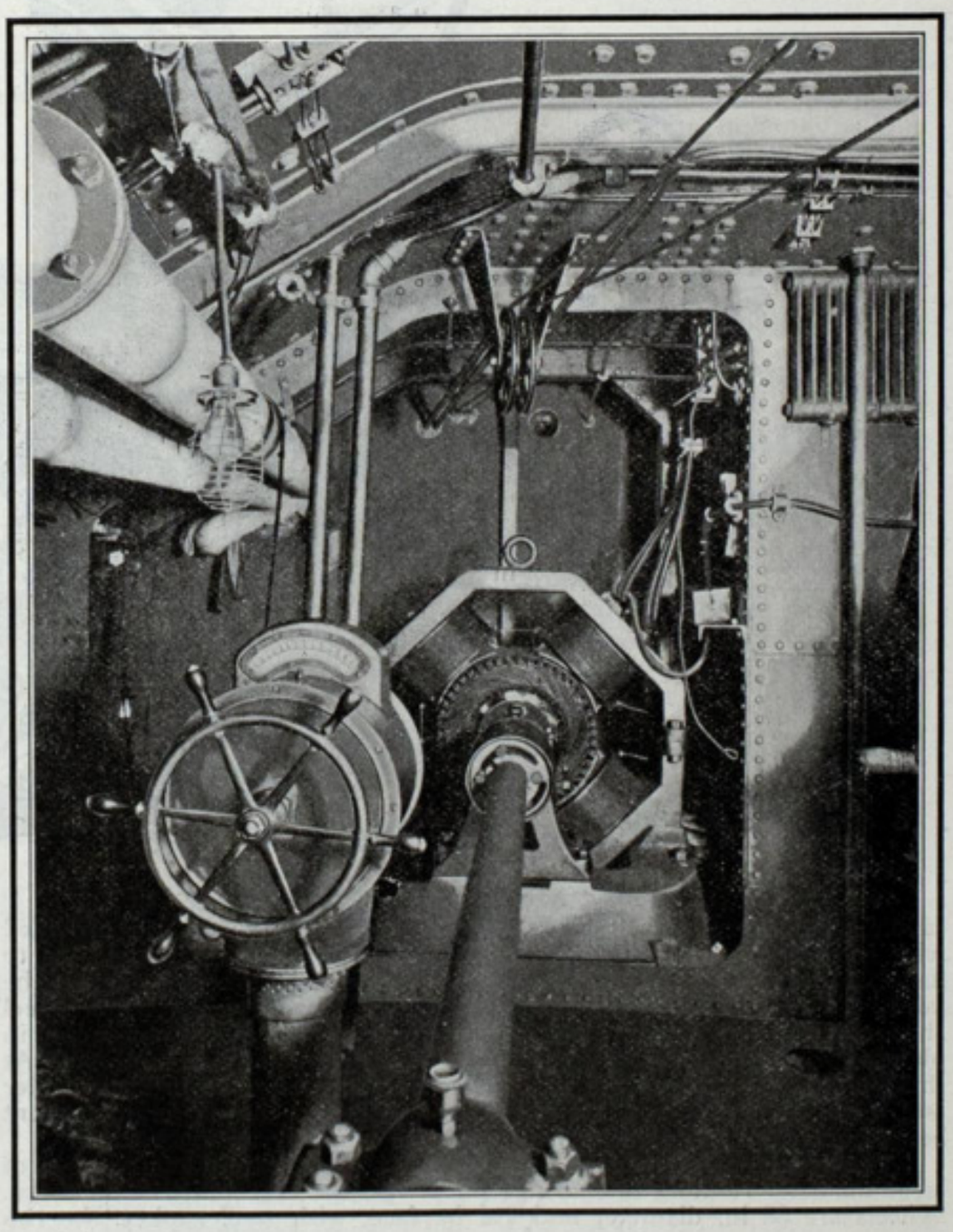


Fig. 9. Rudder motor and auxiliary steering column on Russian Cruiser Variag.

a simple switch in the dynamo room. This is a point of special importance for ships of the navy.

The accompanying cut (Fig. 9) shows an auxiliary steering column located in the stern of the Variag near the motor controlling the rudder. The rudder can be operated from this controlling stand or from the wheel house, as desired. Provision is made, however, so that the rudder cannot

be operated from more than one point at the same time. The only constant expenditure of energy is that used for rotating the armatures of generator and exciter through dead fields.

Among the vessels that the company has equipped throughout or partly equipped with its electrical products, may be mentioned the following:

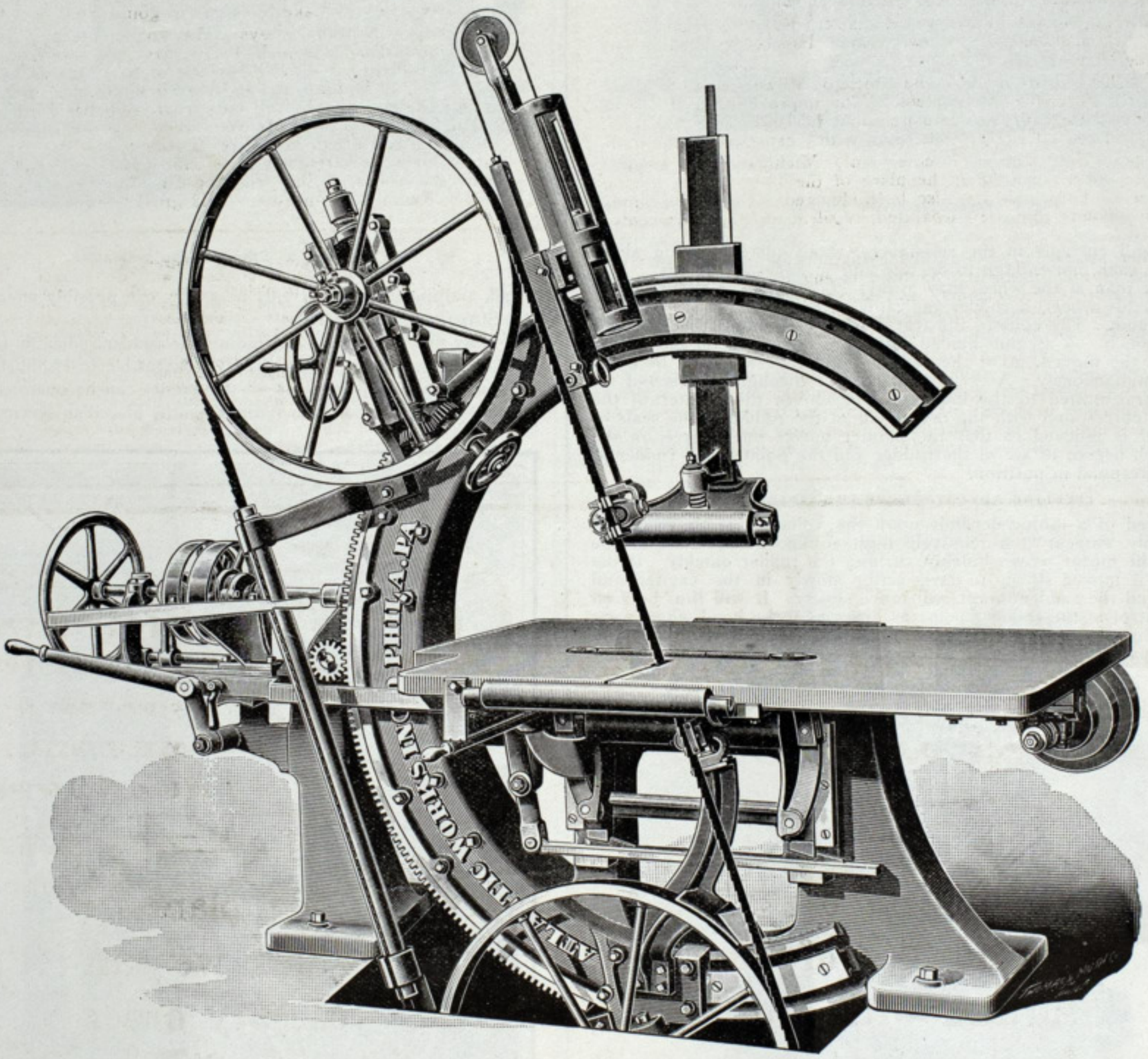
Merchant Marine: St. Louis, St. Paul, New York, Philadelphia, Westernland, Noordland, Belgenland, Friesland, Merion, Haverford, Zeeland, Vaderland, Bosnia, Aragonia, Assyria, Northumberland, Frederick E. Richards, La Grande Duchesse, Bulgaria, Oriole.

Yachts: Enterprise, Atalanta, May, Intrepid, Aphrodite, Margarita, Niagara, Alceda, Utowanna, Clermont, Utopia, Josephine.

Government: Brooklyn, Baltimore, Wasp, Sherman, Pennsylvania, Meade, Ohio, Supply, Grant, Indiana, Burnside, Hist, Connemaugh; Russian cruiser Variag, Russian cruiser Pobieda, Russian battleship Peresviet, Russian gunboat Pallada, Russian transport Gromoboy, submarine torpedo boat Holland, police boat Samuel H. Ashbridge.

ADJUSTABLE BEVEL BAND SAW MACHINE.

An illustration on this page shows a new adjustable bevel band saw machine that is especially adapted for the use of ship and boat builders, navy yards, and work where the cut is to be made at varying angles. The main frame is cast in one piece, on which is mounted a heavy circular



saddle which carries the wheels; this is counterweighted and provided with hand and power movement. This is done in such a manner as to have the center of movement for the saw at the point where it pierces the table, the movement being accomplished by means of the hand wheel shown at the left of the illustration, where also is placed an index in plain view of the operator to regulate the different angles required. At this point is also placed the hand wheel for adjusting the pressure roller and lever for raising and lowering the feed roller, the power movement being controlled by a shifter handle placed close by the operator.

The machine is strongly belted. Wheel shafts are made of steel of large diameter running in bearings lined with the best anti-friction metal. Wheels are 38 in. diameter and 2¼ in. face, with steel spokes, the rim being a continuous laminated wood rim covered with canvas and gutta percha. The machine has a power-driven feed roll mounted underneath the table. This roll is so arranged that it can be raised or lowered so as to feed crooked or uneven timbers or be dropped entirely below the table surface when required; it also has a side feed so that a timber may be carried bodily to the right or left as occasion may require and has three changes of feed—10, 20 and 30 ft. The table is 4x6 ft., is level at all times and is provided with rollers at both sides to carry heavy timbers; has the latest improved guides both above and below, the top one being counterweighted to prevent its falling when loosened. There is furnished with each machine one saw 1½ in. wide 23½ ft. long, mending tools and two counter shafts. The weight of the machine is 5,500 pounds. There are tight and loose pulleys on counter shaft of 12 in. diameter and 5 in. face. Speed 375 revolutions. When the machine is to be set up in a place where water can get into the pit in which the lower wheel runs, there is sometimes furnished a water-tight iron box in which to place the foundation for the machine. This forms the pit in which the lower wheel and belt are installed, and will weigh 5,000 pounds. When required there is provided two carriages mounted on circular tracks, one placed at each end of the saw table for the purpose of carrying the ends of long and heavy timbers to the right or left when cutting curves or irregular lines. An adjustable gauge for ripping and re-sawing may be attached to the table when desired. The machine is made by the Atlantic Works, Incorporated, of Philadelphia.

TWO BATTLESHIPS DISABLED.

With the battleship Massachusetts leaking badly and the battleship Kearsarge with one of her big 13-in. guns in the forward turret disabled, there do not appear to be any indications that the North Atlantic squadron, of which these two ships form an important part, will leave these waters on Dec. 20, as announced. It has been known for several days that the Massachusetts was leaking badly and all her pumps had to be used to prevent her from sinking in Hampton Roads. The injury to the big battleship is forward and divers have been working on her trying to make temporary repairs so that she could be taken back to the Brooklyn navy yard and put in dry dock. They have succeeded in reducing the leak so that two pumps are now keeping her clear. The battleship Kearsarge, soon after leaving dry dock at Brooklyn, fired her 13-in. gun in the forward turret and the recoil cushion failed to act properly. The big gun was totally disabled, for a time at least. It is thought that the gun will have to be dismounted and heated, to replace her bands, which have been sprung about 10 in.

Anthony J. Drexel's new twin screw steam yacht Margarita, which has been built at Scott's yard at Greenock from designs by George L. Watson, had her long distance trial recently. The result was very satisfactory, the yacht making 17.95 knots an hour. This is the third yacht of this name which Mr. Drexel has owned. Her dimensions are 289 ft. over all, 36 ft. beam, 17 ft. depth and a Thames measurement of 1,789 tons.

The Panama Railroad & Steamship Co. has instituted its own line of steamships between San Francisco and Panama and is prepared to take through bound freights for eastern ports in any amount.

SHIP BUILDING RETURNS.

The bureau of navigation reports that seventy-five vessels of 22,611 gross tons were built in the United States and officially numbered during the month of November, as follows:

	WOOD.				STEEL.				TOTAL.	
	SAIL.		STEAM.		SAIL.		STEAM.			
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and gulf	36	10,399	9	558	1	1,120	3	6,630	49	18,707
Pacific	4	971	2	75	----	----	----	----	6	1,046
Great lakes	----	----	5	86	----	----	2	2,394	7	2,480
Western rivers	7	118	6	260	----	----	----	----	13	378
Total	47	11,488	22	979	1	1,120	5	9,024	75	22,611

The largest steel steam vessel included in the list is the Sonoma of 6,253 gross tons, built at Philadelphia for the Oceanic Steamship Co.

AROUND THE GREAT LAKES.

On the northwesterly end of the outer breakwater at Chicago harbor a fixed red light instead of a fixed white is now shown.

Capt. John Hagen, well-known vessel master, died at Marine City a few days ago. He had been ill for two years. His last command was the steamer Cherokee.

The new 30,000-ton ore dock of the Chicago, Milwaukee & St. Paul railroad at North Escanaba is completed. The improvements at North Escanaba have cost the railroad company about $350,000. The new dock is 720 ft. long and has 120 ore pockets, each with a capacity for 250 tons.

At Wind point light station (Racine point), Michigan, a siren operated by compressed air has taken the place of the 10-in. steam whistle heretofore in use. The signal has also been changed. The siren sounds blasts of three seconds' duration, separated by silent intervals of twenty-seven seconds.

J. L. Weller, for twelve years resident engineer of the St. Lawrence canals at Cornwall, but for the last six months engineer in charge of the Port Colborne harbor improvements, has just received the appointment of chief engineer on the Welland canal, in the stead of W. G. Thompson, resigned, and will have his headquarters at St. Catharines.

Each of the side wheel passenger steamers of the Cleveland & Buffalo line, City of Erie and City of Buffalo, have made 104 round trips of 360 miles length. Adding forty or more trips to Dunkirk, Sundays, together with lake rides and special short trips, it is found that the distance traveled by each of the steamers was about 40,000 miles; and all this without a stop of any kind on account of machinery. These vessels were built by the Detroit Ship Building Co. On account of the Pan American Exposition at Buffalo next summer, these steamers will be called upon part of the time for double service between Cleveland & Buffalo, and will cover full 60,000 miles each during the season.

Little Rapids cut, just below the Sault canal, is one of the most dangerous channels in the St. Mary's river and it is therefore gratifying to learn that with funds already in hand Col. G. J. Lydecker, United States engineer, will very probably begin the work of widening early next spring. At present the cut is only 300 ft. wide, but it will eventually be 1,000 ft. wide.

Capt. James Sanford has bought from Bigelow Brothers of Chicago the schooner S. M. Stephenson for about $7,000. Capt. Sanford will make a steamer out of the Stephenson, using the engines of the old steamer Cleveland. The Cleveland will be converted into a tow barge as a consort for the newly converted steamer. Thus the Cleveland will be propelled by the same machinery which she has had for thirty-five years, but it will be in another boat.

One cargo out of and another into a ship in a day is certainly very rapid, especially when the capacity of the vessel is nearly 3,000 tons. The steamer Parks Foster arrived at Sheboygan at 5:30 p. m. on Wednesday last with 2,865 tons of coal. At 4:20 p. m. Thursday the Foster left Manitowoc with 140,000 bushels of barley and oats. In 22 hours and 50 minutes over 5,700 tons of freight were handled in and out, and the steamer traveled thirty miles on Lake Michigan in going from port to port.

A dispatch from Buffalo, says: The wooden steamer Bermuda, built in 1897 by James Davidson in Bay City, has been sold through Drake & Maytham of Buffalo, to W. J. Woodside of San Francisco. She will be loaded with coal at Halifax, and at New York will pick up enough freight to complete the cargo. She will be sent around the Horn and be placed in the Pacific coast trade. Mr. Woodside says he can purchase boats cheaper on the lakes than in any other part of the country. He is now negotiating for a steel freighter for Pacific coast trade and will place the order with the American Ship Building Co. The Bermuda is 220 ft. over all and 41 ft. beam. She measures 1,312 gross tons.

U. S. Engineer Office, Detroit, Mich., Dec. 1, 1900. Sealed proposals will be received here until 12 o'clock noon, standard time, Jan. 3, 1901, and then publicly opened, for furnishing material and labor of all kinds necessary to construct and put in operation one large steel-hulled, self-propelling, seagoing hydraulic dredge, with all necessary appliances complete, including electric light plant, distilling and refrigerating machinery; or the dredge without outfit. Bidders to state time of delivery. Information furnished on application. Thos. H. Handbury, Major, Eng'rs. Dec. 27.

PROSPECTS FOR AMERICAN COAL IN SPAIN.

BY CONSUL-GENERAL LAY.

Barcelona, the principal port in Spain, consuming nearly 700,000 tons of coal yearly (550,000 of which come from England), offers a good market for American coal if the problem of cheap transportation from the United States can be solved. Local quotations (per ton) of British and Spanish coals are at present:

DESCRIPTION.	Shillings.	
Best Cardiff steam	40	$9.73
Second-class Cardiff steam	38	9.24
Newcastle steam	31	7.54
Newcastle gas	31	7.54
Scotch steam coals	29	7.05
Aviles and Gijon	29	7.05

The freights on coal cargoes from Cardiff, Newcastle and Scotland vary every month, but are at present:

FROM	Per ton. s. d.	
Cardiff	11 6	$2.80
Newcastle	12 6	3.04
Glasgow	12 6	3.04
Aviles and Gijon	10 6	2.55

Steamers with coal cargoes discharge in the outer harbor, moored stern on to the quay. The depth of water at this usual discharging berth is about 23 ft., but steamers of 26 or 27 ft. could also be accommodated if necessary. Discharging can be done at the rate of 500 to 700 tons per day, but, as the usual British coal charter party stipulates for only 300 to 400 tons per day, unless the ship is willing to pay dispatch money, this rate is not usually exceeded. A private concern is now constructing an aerial electrical apparatus, which, it is claimed, will unload at the rate of 800 or 900 tons daily. The Spanish government has recently given concessions to local companies to maintain two floating coal hulks for bunkering ships, and thus avoid duties. The usual terms of credit allowed by British merchants are open credit for thirty days, less 2½ per cent. discount; but some firms allow three months' credit to some of their customers, accepting drafts at ninety days in exchange for documents. The standing of most of the firms engaged in the coal trade is good, and even during the present crisis no failure has been recorded. The obstacles to be overcome in introducing American coals are:

(1) As the freight from British ports varies according to supply and demand so does it also from the United States, but in a much greater degree, following the demand for tonnage for cotton and grain cargoes to northern Europe and the Mediterranean. One cargo of American gas coal imported during the month of May paid 18s. ($4.38) a ton freight. At the present writing, freight rates are quoted at 22s. ($5.36) per ton.

(2) The steamers offering to load for an Atlantic voyage are generally of 3,000 to 5,000 tons dead weight, and it is difficult to place so large a cargo with one merchant or even with several. The steamers usually loading in British ports for this trade average from 2,000 to 5,000 tons. Steamers from Wales and Scotland generally get a cargo in the shape of ore and fruit sufficiently large to pay expenses, by calling at several Spanish ports for the return trip; colliers from America should get a small amount of wine, ore and dried fruit, but colliers cannot usually depend on return cargoes from Spain, except those of ore.

(3) As American steam coal has never been imported here, it is very difficult to estimate its exact value as compared with other descriptions, such as Welsh and Scotch coal, and, although an analysis can always be given, merchants are not inclined to purchase without some more practical proof of quality.

Although American coal has benefited very considerably by a royal decree which came into force in Spain on March 20 last, there is still a slight extra charge as compared with European coal. Previous to the above date the total charges on a ship arriving at this port with a cargo of American coal were 9 pesetas (about $1.35 at present exchange) per ton, whereas under the new tariff the rate on non-European cargoes of coal is reduced to 4 pesetas (about 60 cents). The charges on a steamer with European coal are about 38 cents, which makes a difference in favor of European coal of 1.50 pesetas (about 22 cents) per ton. These charges are in the nature of "port and light dues," and are leviable on the ship, and have nothing to do with the custom house duty, which is payable by the receiver in all cases.

In my opinion, the best way to introduce our coal into this market is to send a small quantity at first as a sample, dividing a cargo between Italian and Spanish ports; and if the coal and prices suit the local dealers, to make profitable arrangements for colliers. The present offers from America of $2.50 per ton f. o. b. United States ports, cash against shipping documents, on coal that is unknown here, and freights from 20s. to 22s. ($4.86 to $5.36) a ton, are poor inducements to the Barcelona coal merchant.

MAKING ROPE AT CHARLESTOWN NAVY YARD.

Making rope by hand is almost a lost art in this country. There are only two rope walks in the United States where it is practiced at present. One of these is at the Charlestown navy yard, which, by the way, is the only rope walk owned and operated by the United States government. The products now made by hand are used principally for serving wire rope, rigging and other ropes needing protection from the weather or from rubbing. They are all tarred. Included in the so-called serving cords are marline, houseline, hambroline, round line and two and three-yarn spunyards. The Charlestown rope walk uses three kinds of hemp—Russian, Manila and Kentucky. At present rope is being made from all three. The variety which comes from our newest possession is the lightest in color and of fine quality. Recently a cargo of 400 tons was imported from the Philippines by the government. Com. John E. Pillsbury, head of the equipment department, who has charge of the rope factory, and Superintendent Fred A. Jenks, one of the most expert rope-makers in the country, are both enthusiastic over results obtained from this importation. The Russian product is a medium in color between the light Manila and the dark Kentucky hemp. The former is finer than the latter in quality, but is not nearly so strong. Kentucky hemp is tough and coarse.

The raw product is delivered at the factory in great bales weighing nearly 300 lbs. The first step in the manufacturing process is taken when the bales are broken open and the "heads," or bunches, of hemp are taken out to be hackeled, or topped. Only a few of the old hands can do this work, as it requires a thorough knowledge of the amount of combing different qualities of hemp need in order to be ready for the spinners. A hackel is simply an immense iron comb with long teeth which stick up several inches from its back. The man who does this work takes a head of hemp and, standing some 2 or 3 ft. from the comb, tosses the fibers upon it and draws them through the sharp teeth. This is kept up until all the short fibers are culled out; then the bunch is reversed and the other half put through the same process. When the head of hemp leaves the hands of the hackeler it consists of only the long, strong fibers, and is ready to be spun into rope. The heads of fine, long, hemp fibers are passed along to the spinners' loft, where the actual ropemaking commences. The manufacture of rope is a picturesque art, and the almost extinct hand spinner is the quaintest and most interesting feature of it. The hand spinner's loft is in the attic of the main building, and is a room some 400 ft. in length. At one end is "the wheel," a large balance wheel used for furnishing power to turn four hooked spindles which are set in a frame nearby. A boy turns this wheel. At intervals down the length of the "ground," as the loft floor is called, are racks with pegs that guide the turning threads and keep them in place.

When the spinners have wrapped a bundle of hemp fibers about their bodies they look not unlike men with life preservers on. In his right hand the spinner holds a woolen cloth to aid him in guiding the strands as they slip between his fingers. With the inner part of his hand he gathers the threads and regulates their bulk as they unwind from the bunch around his waist; with his thumb and forefinger he shapes them. Slowly he walks backward as the threads are spun, the wheel giving them the necessary turn. Each of the threads is sixty fathoms long. The coil of fibers about the spinner's body is sufficient to make forty-eight threads, and in doing his day's work the spinner walks eight miles, four ahead and four backwards. When three threads have been spun they are put together between a new set of pegs, and a man holding in his hand a cone-shaped piece of wood having three grooves cut the length of it, and called "the top," placing a thread in each groove, walks rapidly up the ground toward the wheel. As they pass through the grooves, the wheel gives the required turn to the three threads of the cord. After the cords are finished they are put in a rack and kept there until seventy-five or eighty have been collected and a turn put in them. Such a bundle of cords is called a "junk" and weighs from 350 to 400 lbs.

The "junk" is now sent down to the tar house and immersed in a trough filled with hot tar. On being removed from the tar it is passed through a curious mechanical device called a horseshoe nipper, which squeezes all the surplus tar from the bundle. The nipper derives its name from the fact that it is shaped almost like a horse shoe. The "junk" now goes to the yarn house to season. This seasoning or drying process requires from five to six weeks, but oftentimes, when there is a rush order on hand, it is allowed much less. After the "junk" has seasoned it is spread on the ground and the turn taken out of it. Finally the cords are strapped up into coils. "Strapping," as it is technically termed, is winding the cords on a reel. The man who does this holds in his hand a short piece of tarred rope which he twists several times around the cord that is being wound on the reel, thus giving a purchase that enables him to wind it very tight. This piece of tarred rope also serves to smooth the surface of the cord, giving it a glossy appearance obtainable in no other way. So compact has the bundle now become that it retains its shape when removed from the reel. When the strapping is finished and the reel removed the bundle of cord is ready for shipment. It is thirty years since hand rope making was in its prime in the United States. One man can now do the work which it formerly took eight men to perform; a machine does about the same amount of work as a hand spinner, and one man can tend eight machines.

A young man who has learned something of the world and has considerable maturity of judgment can get more benefit from a school between the ages of 25 and 28 than between 18 and 20. This is especially true of professional training. Few can determine what profession they are best qualified for until they have tested themselves and found what they can do best. It is next to impossible for a man who is learning a trade and is supporting himself by it to take the time or spare the money for a college course, but thousands of such men are studying successfully by mail. The average age of students taking correspondence courses, as shown by the records of The International Schools, Scranton, Pa., is over twenty-five years, and the greater number of men actually engage in the trade or profession they are studying.

TRADE NOTES.

The Allegheny Steel & Iron Co. will erect a steel plant at Brackenridge, Pa. The contract for the buildings has been let to the American Bridge Co. This includes two producer sheds, a boiler house, a main building, an open hearth building and a crane run way. The main building will be 72x252 ft., with four lean-tos. The open hearth building will be 72x161 ft., with three lean-tos. About 500 tons of steel will be required.

Mr. George A. Graham of Rat Portage, Ont., president and manager of the Rainy River Navigation Co., informs the Review that all the steamers of the company are in winter quarters after a successful season. The Rainy River company now has the steamers Keenora, Maple Leaf, Agwinde, Majestic, Edna Brydges, City of Alberton and Undine, as well as seven barges, which trade on Lake of the Woods, Rainy river, Rainy lake and tributary waters.

The Greenfield Steam Engine Works, East Newark, N. J., manufacturers of gas and gasoline engines for marine use, are putting in an automatic engine for the machine shop of cruiser Buffalo, which is now in dry dock at the Brooklyn navy yard. Engines made by this company are suited to manufacturing purposes and are especially adapted to electric lighting or quiet running and good governing, or where floor space and room is an object. They do not require expensive foundations. Regularity of speed, equal to the best automatic cut-off engine, is guaranteed under all variations of load and steam pressure. The engines are also made with link motion for reversing and are well adapted for power on steam yachts, tugboats, etc.

The Westinghouse Co. has just issued a beautiful catalogue on the subject of the "Steamloop and Holly Gravity System," which is a system of returning the hot water of condensation from steam pipes to boilers. Briefly the story is: This system is the only one which causes the water of condensation to automatically flow back into the boiler. It returns the water at practically boiler temperature. It is simple in construction; has no moving parts, is continuous, rapid and positive in action; and is of the highest possible efficiency and economy in operation. It is applicable either before the steam is used, as at the throttle of the engine, or after the steam is used, as in returning the condensed water from jackets, coils or tanks. The catalogue is illustrated with half tones of plants which are using the system and also with excellent drawings of the philosophy of it.

A NOTABLE VISITOR.

The Chinese minister to the United States and minister plenipotentiary, Wu Ting Fang, visited Cincinnati a few days ago. Mr. Minister (his addressed title) is quite practical, having large mill interests in Canton and Tien Tsin; and as he especially wished to see the latest up-to-date outfit for making cars and for car repairs, he visited the wood-working machinery establishment of the J. A. Fay & Egan Co., where Thomas P. Egan, the president, explained the different machines to him. The Fay & Egan works are so extensive that Mr. Minister had an opportunity of seeing almost an entire outfit in operation, and he expressed himself as being highly pleased. He showed a wonderful amount of skill in questioning Mr. Egan regarding the various machines and their operations. Mr. Wu laid great stress on the fact that he was born in Canton, a city of the same name as the home of President McKinley.

A complete plant for steel ship building is offered for rent by the estate of Hugh Ramsay of Perth Amboy, N. J. It includes well-equipped machine and blacksmith shops, plate and angle shops and mould loft. The ship yard is within twenty-five miles of New York city and within the limits of an excellent harbor. There is 40 ft. of water at low tide in front of the yard.

PATROL BOAT WANTED.

The Ohio Fish & Game Commission wants to buy a boat suitable for police patrol on the waters of Lake Erie. Send description and price of boat to A. J. Hazlett, Commissioner, Bucyrus, O. Dec. 20.

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Length 48 to 60 ft. Draught not to exceed 5 ft. Simple power; good condition; speed 10 to 12 miles an hour. Boat is to be used as a ferry. Address Erie Yacht Club, P. O. Box 148, Erie, Pa. Dec. 6

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Farrar & Trefts.....Buffalo.
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Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
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Jenks Ship Building Co.....Port Huron, Mich.
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Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.

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Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

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Kingsford Foundry & Machine Works....Oswego, N. Y.
Wood, R. D. & Co.....Philadelphia.
Worthington, Henry R.....New York.

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New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Wood, R. D. & Co.....Philadelphia.

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Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

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American Steel & Wire Co.....Chicago.

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Roebling's Sons, John A.....New York and Cleveland.
American Steel & Wire Co.....Chicago.

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American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

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Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

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American School of Correspondence.....Boston.
Buffalo Nautical School.....Buffalo.
Chicago Nautical School.....Chicago.

SCREW MACHINES.
Niles Tool Works Co.....Hamilton, O.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

SHAPERS.
Niles Tool Works Co.....Hamilton, O.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

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American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

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Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
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Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
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Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.
American Bridge Co.....New York.

SURVEYORS, MARINE.
Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.
Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.
Helios-Upton Co.....Peabody, Mass.

TIMBER—LARGE PIECES.
Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Standard Pneumatic Tool Co.....Chicago.
Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

TRUCKS.
Boston & Lockport Block Co.....Boston.

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American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.
Playfair's Barge & Tug Line.....Midland, Ont.

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Swain Wrecking Co.....Detroit.

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Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
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Moffat & O'Brien.....San Francisco.
Pauly, H. J.....Milwaukee.
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American Steam Gauge Co.....Boston.
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Drein, Thos. & Son.....Wilmington, Del.
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MARINE REVIEW

VOL. XXII. CLEVELAND, O., DECEMBER 6, 1900. No. 23.

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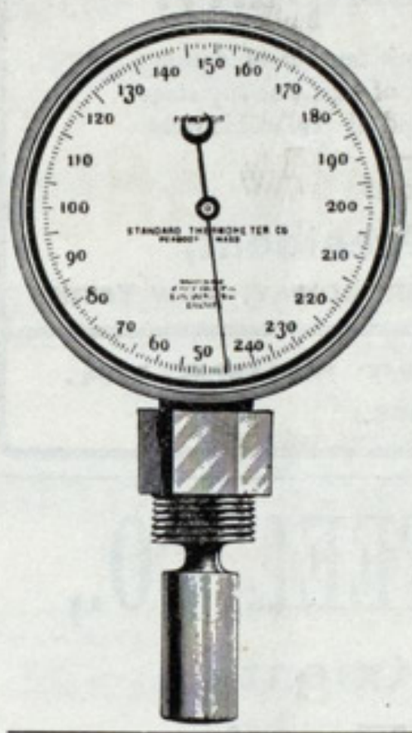

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